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THE COMMITTEE ON PROBLEMS OF NEUROTIC BEHAVIOR
DIVISION OF ANTHROPOLOGY AND PSYCHOLOGY

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ANOREXIA NERVOSA WITH PSYCHIATRIC OBSERVATIONS*

LINCOLN RAHMAN, M.D., HENRY B. RICHARDSON, M.D., HERBERT S. RIPLEY, M.D.**

THE SYNDROME of anorexia nervosa was described and named in 1874 by Sir William Gull (4, 5), who wrote of "a peculiar form of disease occurring mostly in young women and characterized by extreme emaciation." Although he had seen cases in males, he described it as occurring typically in girls between 16 and 25, who showed extreme loss of weight with no demonstrable organic disease, amenorrhea, a slow starvation pulse, and lowered respiration rate (the last two suggesting the low basal metabolism later found regularly to be present), a tendency to irritability, and a remarkable energy and ceaseless activity which these patients persist in maintaining "in spite of the low ebb of the nutritive functions." Gull regarded the cause as a "perversion of the ego" and said, "The want of appetite is, I believe, due to a morbid mental state." Although he had seen one fatal case he regarded prognosis for the most part as favorable. "None of the cases, however exhausted, are really hopeless while life exists." He advised feeding at regular intervals, surrounding the patients with "persons who have the greatest control over them," and said that "the inclination of the patient should in no way be consulted."

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C. W. Ross, 1938 (12) quotes passages from an earlier description of the syndrome by Richard Morton who, in his book, "Phthisiologia," 1694, in the

chapter entitled "Of a Nervous Consumption," regarded "the immediate cause of this distemper" to be "in the System of the Nerves."

Lasègue, 1873 (6), at about the same time as Gull, described the same clinical condition, under the name "hysterical anorexia." Gull's term has been the one generally used.

Subsequent papers have added many case reports to the literature but until recently without increasing the knowledge of the pathogenesis of the disorder or of the factors involved.

Stephens, 1895 (17), and Conybeare, 1930 (2), described fatal cases with necropsy indicating no pathological findings which could be regarded as primary.

Ryle, 1936 (14), published an extensive review of the literature with a report on 51 cases which he had observed personally.

Recently interest has aroused over the relationship of Simmonds' disease and anorexia nervosa. Ryle, 1936 (14), commented on the tendency of "physicians subject to the lure of endocrinology" to look for the cause of anorexia nervosa in a primary deficiency of the endocrine glands, and many cases diagnosed Simmonds' disease appear to be typical cases of anorexia nervosa. The disturbances in carbohydrate metabolism in anorexia nervosa have been studied by C. W. Ross, 1938 (12), and by Sheldon and Young, 1938 (16), who concluded that the peculiar glucose tolerance curves were due to the previous diet and that there was no need to invoke an endo-

^{*} This work has been aided by a grant from the Josiah Macy, Jr. Foundation.

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crine explanation. Sheldon, 1937 (15), has suggested that anorexia nervosa may be "a functional Simmonds' disease—a pituitary black-out of psychological origin", and Farquharson and Hyland, 1938 (3), have discussed the differential diagnoses from Simmonds' disease in detail. Richardson, 1939 (11), discusses 6 cases, 3 of which were previously diagnosed Simmonds' disease—one with death and necropsy report—in all of whom psychological factors were found to be of great importance and whose diagnoses later were changed to anorexia nervosa.

Since previous reports have placed relatively little emphasis on the personality factors which have played a rôle, in this investigation of 12 cases special attention has been paid to the relation between the psychodynamic and the somatic features. Case I was studied more thoroughly from the psychiatric standpoint than the others and is therefore discussed in greater detail.

CLINICAL OBSERVATIONS

Case 1, a 26 year old, Protestant office worker, was admitted to the medical service in January 1937, after six years of fasting which had reduced her weight from 128 to 65 lbs. She had insisted on going about town in spite of physical weakness which had become so severe that she had to be lifted onto busses. On the medical service she hid her food, vomited after eating, and asked about the strength of the poisons that might be found on the ward. After observation for $2\frac{1}{2}$ weeks she was transferred to the psychiatric service.

In September 1930, at the age of 20, and three months after graduating from college, the patient had her first and only sexual intercourse, with a school teacher 8 years her senior. He was emotionally unstable and felt that in paying attention to a girl he was doing her a favor for which she should be grateful. About this experience she later said, "I felt I had to cut sex feelings out of my life and began to

diet right after that.... I tried to say I was only in love with love—I realized he was only in love with me physically. Inwardly I was so affected that I almost lost my reason". She began to eat less and felt that when she starved herself she became devoid of feeling. In retrospect she said she felt like monks or ascetics who denied and punished themselves. She dieted more strictly after hearing a remark at a party about her plumpness. At first she had to fight against hunger but after two months hunger disappeared completely and she became fascinated with working out the mathematics of her caloric intake. In the first six months her weight fell from 128 to 110 lbs.

At this time she was interested in a medical student who carried on his courtship almost entirely by correspondence. She had a fear that the relationship would not last. Her continued weight loss caused his parents to suspect tuberculosis and to oppose the match so that they drifted apart. About a year after the onset of her dieting her menses ceased. She was not troubled, since they had been a "nuisance" always, and said, "When I ceased menstruating I had a reason for not attracting men. My secondary sex characteristics had atrophied and I felt I wouldn't worry about sex and be disappointed."

In January 1932, when she lost her job as statistician and was no longer supporting herself, she felt that she should spend as little as possible on food and her weight fell to 100 lbs. By October 1933, three years after the onset, her weight was down to 75 lbs. and she was admitted to a hospital, where she failed to follow the prescribed diet and gained only 2 lbs. in three weeks.

At home she continued on a diet consisting chiefly of black coffee, oranges, lettuce and two small sandwiches a day. Her friends noticed a change in her personality. She mingled less and lacked enthusiasm for any activity, but in spite of her diminished strength she felt compelled to take long walks even in the worst weather and was constantly on the go. Her weight had fallen to 65 lbs. when she was admitted to the New York Hospital in January 1937.

She had been an only and wanted child.

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frie A mai was Birth and early development were considered normal. She was breast fed for an unknown period. At the ages of 8, 12 and 19-20 she had periods when she ate more than usual and was plump. At 10 she had feelings of unhappiness and disgust on hearing neighbors say that her father had been showing attention to a girl while the patient's mother was away from home. Menarche occurred at 13. Menses were regular every 21 days, lasting 4 to 5 days with rather profuse flow and no pain. When she was 13 her mother died suddenly after a hemorrhage from an unsuspected peptic ulcer. The patient ate poorly for a month and for several years was often found sobbing in her room. For a time she lived with a maternal aunt but felt that her aunt had rejected her mother and that this feeling was carried over to her.

She was precocious in school and made many acquaintances. During her high school years she was attached to a girl cousin and refused to go out with boys. After graduation from high school at 16 she entered an Eastern girls' college where she majored in economics. In college she was active socially and did average scholastic work. During her first three years she roomed with a girl who she felt dominated her. She was afraid this girl would go out with the man with whom she had been going while in college and with whom she later had the intercourse.

In her senior year she felt unusually dissatisfied, had difficulty in making small decisions, felt that she did not deserve any luxuries, had to place her clothes in exactly the same place every night, and felt an extraordinary desire to overeat. She felt depressed and thought that eating relieved the tension. She considered herself overweight. (See Fig. 1.)

After leaving college the patient wanted to live away from her father and in a different city, feeling that he was critical of her and that she was not compatible with him. She went to live with him, however, when he accused her of ingratitude and her friends told her that it was her duty.

As a girl she had been friendly and made many friends although few close ones. She was close-mouthed about personal affairs. Her favorite sport was swimming but she gave it up during her present illness because of obsessive fears of drowning herself. She was regarded as nervous and fluttery, was overconscientious, preferred reading at home to going out with boys, and often had a tendency to be depressed. Vulgar stories embarrassed her. She felt "a great conscience against sexual matters." She denied ever having masturbated.



FIG. 1. Case I before she began to diet at 20 years of age. Weight approximately 125 lbs.

Her father was Protestant and her mother Roman Catholic. The patient was baptized a Protestant but from 7 to 18 she went to the Catholic church. After entering college she lost faith but occasionally attended Protestant church services after 18. The parents were poorly adjusted in marriage and at one time con-

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sidered divorce. Belonging to different churches, they had many quarrels and theological discussions centering about the observance of fast days. The mother was a restless, dissatisfied, ambitious woman who compared the patient unfavorably to outstanding children in the neighborhood. The father, living at 56, was a tense and distant

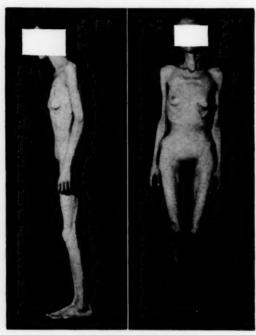


Fig. 2. Case 1 at the time of admission to the New York Hospital at the age of 26. Weight 65 lbs.

man, who worried excessively about his peptic ulcers and talked much about his symptoms and diets. He worked as a photographer, was fussy and critical, and expected the patient to be solicitous.

Physical examination on admission showed an extremely emaciated young woman. (See Fig. 2.) Weight was 65 lbs. (29.9 kg.) and height was 5 ft. 4 in. (159 cm.). Pulse was 68. Her skin was dry and scaly and her extremities were cold. The pubic hair was of masculine distribution. Blood pressure was 66/32. Gynecological examination revealed atrophic external genitalia, cervix and vagina. Breasts were atrophic. X-rays of the skull were negative. Basal metabolism was minus 27 per cent. Vaginal smear was of the atrophic type. A glucose tolerance test showed a fasting blood sugar of 51 mg. per cent and values of 59 after ½ hour, 57 after one hour, 48 after two hours and 27 after three hours. The physical and blood findings were otherwise entirely normal.

Mental examination showed no defect in sensorium or disorder of spontaneous conversation. In reply to questions about her mood she said, "I didn't see much to look forward to or anything to live for. I had a spell of being absolutely spiritless, just existing. . . . I didn't feel I was worthy of anything except bare existence." Although she had no definite plans of suicide she felt that eventually life would end that way. She went on to say, "I've lost hold of myself. My personality is disintegrated, so to speak.... I was too heavy and softlooking. I felt I looked gross, like a peasant. ... I thought I'd be more attractive to the man I was interested in. . . . I feel comfortable this way and there's the old picture in the back of my mind of being too fat."

She readily adjusted herself to the routine of the clinic, seemed at ease with the other patients and kept well occupied. She was under the care of a woman physician who instituted a passive type of treatment. The patient was not questioned about the amount of food eaten. The nurses were instructed not to urge her but to observe her carefully. It was noted that she tried to give the impression of eating but in reality pushed the food from one part of the plate to another. Annoyance was evident when there was even a suggestion of urging. She stood for long periods of time even while knitting or reading. Later she said this was due to pain over the ischial tuberosities while sitting.

In discussions she repeatedly referred to her feelings of inferiority and wondered whether she was trying to hide behind a physical appearance of inadequacy. She spoke of having the "will to fail" and of preferring to anticipate failure because the disappointment would then be less keen if she failed to attain her goal. There had been a tendency "to need to have thoughts in perfect form."

When the possibility of endocrine treatment was mentioned in March she became apprehensive and felt she could conquer cold wei pita of c

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her difficulties without medication. She resorted to stratagems such as hiding a cold cream jar in her pocket while being weighed. In the first six months in the hospital under this regimen there was a gain of only five pounds.

She was then transferred to a male physician who instituted more active treatment. It was explained to her that every possible therapeutic approach should be used and that forced feedings might be necessary in order to build up her physical condition. She threatened to leave but decided to remain because she was "determined to see

this thing through."

With the purpose of supplying the deficiency of estrogenic hormone, treatment with daily intramuscular injections of 2,000 R.U. of estradiol benzoate (progynon-B) was given from July 11th to 23rd. She began to feel less tense and apprehensive and noted improvement in appetite. Four subsequent monthly series of injections using slightly larger doses (3,000 to 5,000 R.U. daily) were not accompanied by any subjective change in her condition. In March 1938, four months after estradiol benzoate was discontinued, she had the first spontaneous menstrual bleeding in six years. Vaginal smears showed changes indicating a return of follicular activity which was below that seen in a normally menstruating woman. Since then she has gone through regular cyclical changes of the vaginal epithelium, usually with scanty menstrual bleeding although at times bleeding has not occurred.

During July food intake steadily rose from 1,200 to 2,500 calories. Weight began to increase and continued to do so until in March 1938, it reached 99 lbs. Toward the end of July she spoke of wanting to enjoy life and said, "I feel I am gaining and can't help it." She began to think more of plans for the future and to practise shorthand daily. Basal metabolic rate on September 18, 1937, when her weight was 78 lbs., was minus 3 per cent. Pulse tended to be low at first, later showed marked variation, and finally, with increase in weight, was more consistently higher.

She visited outside the hospital, at first with relatives and later unaccompanied, and enjoyed these visits. On one occasion

she felt panicky while riding in a subway train and had a sense of great relief on returning to the hospital. Frequently she had the feeling that she had put too much strain on her emotions and they had dried up because of the effort she used in controlling her feelings. "I would wake up saying,

'I've got to learn to be happy.' "

Throughout she showed mood variations and described a change from a "bleak despair" to a more genuine feeling of sadness and concern about herself. At times she continued to show indecision and was troubled by lack of clarity of thought. There was a tendency to copy the manner of other patients, especially those she admired for their cleverness or social standing. Her compulsive tendencies gradually became less troublesome. While still a patient in the hospital, she started work and has continued to work successfully since then.

There was a marked improvement in her physical condition. Her skin became less dry, a moderate amount of subcutaneous fat was present, and genital atrophy became much less marked. On April 16, 1938, her glucose tolerance test gave fasting 114, ½ hour 170, 1 hour 170, 2 hours

154, 3 hours 103.

During interviews the main features of her personality development were discussed and current situations analyzed. She talked freely and frequently felt a sense of relief following discussions. However, at times she became antagonistic toward the physician because she felt he was effecting a change over which she had little control and she resented her dependence on him.

She was discharged from the hospital in April 1938, approximately 15 months after admission and had weekly interviews thereafter. It should be added that getting a full history was a difficult and longdrawn-out process and that, for example, the history of sexual intercourse was obtained only after her discharge from the hospital when she had begun to talk more freely. Other factors which came to light at this time were feelings that she had been a great disappointment to her parents and was not wanted by her relatives and others. Thwarting by her father had made her

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ts in reatcame quer feel afraid of him and also guilty and fearful. She also believed that had her mother lived she would have hated her mother for trying to live out her own ambitions through her. She stated that she shouldered her father like a martyr because it gave her relief. She felt that at 20 she had not matured as much as other girls at that age and since had not developed beyond that point.

After leaving the hospital she showed

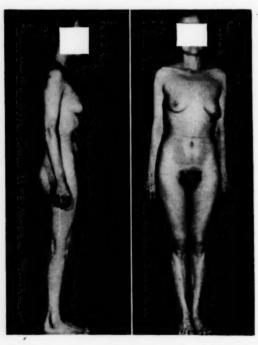


Fig. 3. Case 1 at the age of 29 years. Weight 105 lbs.

some periods of depression and anxiety, particularly in November and December 1938, at times related to situations at her work. In general she showed a return to a more normal type of reaction to ordinary difficulties, particularly a tendency to give up the evasiveness which was quite prominent before. By February 1939, her weight had risen to 105 lbs. and has since remained constant. (See Fig. 3.)

Comment. The roots of the patient's illness go back to childhood. She was a fearful, timid person and inclined to a depressive mood. Following her sexual experience she felt so affected that she "almost lost her reason" and began to

starve herself, whereupon she became "devoid of feeling." She compared herself to monks and ascetics. Her selfstarvation relieved her anxiety over those things that threatened her security and also gave her at the same time a satisfying sense of uniqueness, which satisfied her demands for supremacy which she had struggled unsuccessfully to attain by her attempts at perfection. Her starvation served to kill the "gross" or the "physical" in her, relieved her of the need to make an adequate sexual adjustment, and served a depressive purpose in nearly causing suicide. Her attitude toward sex had been influenced by her puritanical mother and aunt and made her look for an emotional or spiritual relationship free from physical contact. She felt that these ideas led to conflict in her feelings about sex and increased her depression. Her mother had frequently urged her to use will power so as to surpass others in accomplishments, and in her self-starvation she found herself doing this to the highest degree.

The mother, apparently in attempting to live out her own ambitions through the daughter, fostered a dependence from which the patient had never been able to free herself, and which she transferred successively to relatives, friends and physicians.

While she was in school and college, the nature of her surroundings made it possible for her to satisfy partially her perfectionistic tendencies; leaving college destroyed this equilibrium.

It should be pointed out that this patient had a short (21 day) menstrual interval, which endocrinologists have often found to be associated with an ovarian deficiency, as demonstrated by a failure to ovulate. This suggests in her case a constitutional endocrine deficiency, quite apart from the endocrine changes which must be regarded as secondary to the starvation.

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Case 2, a 17 year old, Roman Catholic high school graduate, was brought to the psychiatric service in July 1937 because of excessive dieting for two years, with a loss of weight from 157 to 92 lbs., and temper tantrums of increasing severity which reached a climax the day before admission

when she had demanded poison.

At 13 when she entered high school her menses began. She withdrew and became critical, spoke of the girls in school as "cigarette-smoking tramps," and stayed in the house reading books and eating candy and cookies. She became overweight and resented it when her teachers, her older brother and others called her a "heifer," and "disgustingly healthy." When she was 14 her father became concerned over the dangers she might encounter from men and boys on the street and he retired from his job as policeman in order to drive her to and from school every day. When the patient was 15 a girl in the school was forced to leave because of pregnancy. Shortly afterward a boy behind her in class reached forward and touched her breasts. She feared that she was to become pregnant. She thought her breasts and her abdomen were too big and began to diet. In one year her weight fell from 157 to 130 lbs. Her menses stopped at this time. She was delighted to be through with the cramps but at the same time was afraid that she was now really pregnant. She determined to diet further to keep them from returning. She began to read books on diet and the metabolic rate of different foods and became obsessed with the avoidance of anything that might turn to fat. When the family physician prescribed a tonic to stimulate her appetite she refused to take it and ate less than before, accusing the parents of having put something into her food to create an appetite. She became increasingly irritable and fault-finding, flew into violent rages when her minute orders as to what she would or would not eat were not strictly followed. Although she felt tired all the time she forced herself to maintain unceasing activity, feeling that repose even for a few moments would allow some food to turn to fat and not be burned up in the muscles.

She developed compulsions to touch doors, hangings and certain spots on the floor; all doors in the house had to be either fully closed or fully open, and in reading she had to dig her nails into the page on each word which referred to or reminded her of fat.

The patient was the younger of two siblings. When she was born her brother, 5 years older, developed asthma and hay fever, which he has had ever since. She was breast fed for six months and then weaned with difficulty. She was active and sociable until the onset of the present illness. There was no enuresis but she had night terrors right up to her hospitalization and because of these she slept with her mother and caused her father to take a room by himself. She dominated her older brother through the father and was her father's favorite. Her father wanted her to remain always his little girl and never to grow up, wanted her to sit on his knee, and on returning from his police duties hinted darkly about sexual dangers and warned her constantly against men and boys. He alternated excessive indulgence with demands that she should always be grateful and obedient and show him respect. Until she was 16 he insisted on going with her to stores and selecting every article of clothing that she wore. Her mother suffered from many fears and obsessions about death, falling, and kidnapping, which she impressed on the patient.

At 6 the patient had fears of the dark and of anything dead. At 9 she avoided stepping on cracks, fearing bad luck. At 11 she developed fears of explosions and of letting gas escape from the cooking stove. At 12 she saw her paternal uncle being taken out of the house to a doctor's office for a heart examination. She had the vivid thought that he would die in the doctor's office. This premonition proved to be true and she then felt her thought had been responsible for his death. She later had thoughts that her mother would die by Christmas, with the same feeling that the

thoughts had magic power to bring her death to pass. Following this she felt compelled to have the thought that she would commit suicide.

The father was a blustering, rigid, quick tempered, moralistic Irishman of 52, living on a pension from the police department. He grew up in great poverty, one of thirteen children, and at the age of 12 had sexual intercourse with one of his sisters who later had an involutional depression. The mother was a gray, fearful woman of 50 who had had many phobias for years. One of the mother's brothers had been in state hospitals for 25 years suffering from a paranoid schizophrenic illness.

Physical examination on admission showed an emaciated girl 5 ft. $6\frac{1}{2}$ in. (166.2 cm.) tall, weighing $92\frac{1}{2}$ lbs. (42.1 kg.). She had small, undeveloped breasts and an infantile uterus and ovaries. Blood pressure was 102/68. The basal metabolism was minus 7 per cent. Vaginal smear was of the atrophic type. Blood sugar tolerance was fasting 100 mgm. per cent, $\frac{1}{2}$ hour 168, 1 hour 154, 2 hours 133, 3 hours 96. The remainder of the physical and laboratory examinations were negative.

The menses did not return during the first two months in the hospital although she gained 17 pounds in this time. In August she was given 10 daily injections of estradiol benzoate, 3,000 R.U. each, and on September 6th she had a very scanty vaginal bleeding for one day. The injections of estradiol benzoate were repeated from September 10th to 20th and on October 8th to 10th she had scanty to moderate bleeding. In October she was given another series of 15 injections and had a normal period from November 12th to 15th. After this the injections were stopped and vaginal bleeding did not return until the injections were resumed in February 1938.

On admission to the hospital the patient screamed to be taken back home. She was timid, tense and uneasy, stated that she was low and worried over her eating difficulty, said that she had no control over herself and that "the impulse prevented me from eating." Her obsessions and compulsions preoccupied her greatly. The sensorium was clear. She cooperated in eating

and wrote home that the food was delightful, but she wanted immediately to be released and she had outbursts of temper when this wish was refused. She had difficulty in establishing relations with the physician and with other patients, developed a compulsion to chew her food many times and even the water that she drank, felt alone and miserable, and developed obsessive fears that she would have depressive and other symptoms about which other patients complained.

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She spoke of the need to excel others, to show will power by becoming thinner than necessary, of the desire for attention and sympathy, and the feeling of being a fraud because people thought her so sweet and gentle when actually she always felt nasty and disagreeable.

She was discharged 5 months after admission, when she had reached a weight of 120 lbs. She did well for two months but the eating difficulties returned after she went to a party where a partially intoxicated young man was "fresh" to her. She refused to come back to the hospital for interviews or in-patient care, resorted to all the usual tricks employed by these patients, such as putting food in paper napkins to be kept in pockets until it could be disposed of, tving weights under her clothing or drinking water to avoid detection of weight loss, and pushing food about on the dish and concealing bits of it under lettuce leaves. One year after admission her weight was down to 100 lbs., the temper tantrums had returned, and she spoke of awful feelings which began in the genital area and went down to the left foot where she complained of swelling and pulsating feelings.

Comment. This patient when admitted fiercely resented any questions of a sexual nature. The story of being touched by the boy and the ensuing fear of pregnancy was withheld until almost five months after she had been discharged from the hospital. She felt that eating led to obesity, had great fears that if she started to eat she would be unable to stop, and in her behavior showed that obesity was as much to be avoided as pregnancy. Of

great importance in this case was the father's anxiety about sex, as shown by his unusual behavior in retiring from his work in order to drive the patient to and from school so as to protect her from encountering men and boys. The diagnosis was psychoneurotic reaction of the obsessive-compulsive type with schizophrenic features and starvation.

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Case 3. An 18 year old, Protestant high school student, was admitted to the psychiatric service in January 1936, when her weight after four years of dieting had fallen from 124 to 57 lbs. and she had become so weak that she had fallen when trying to get on a bus.

At 13 the patient accidentally witnessed her parents in sexual intercourse when she called them for breakfast. It "disgusted" her. She expressed the desire not to develop breasts, hips or buttocks, avoided wearing sweaters which made them conspicuous, and began to fuss about her food and to lose weight. She said she "could not stand the idea of flesh." Her menses stopped four months after the menarche at 13. She insisted on having a bowel movement after each meal because she feared she would "stick out in front"-i.e., have a large abdomen like a pregnant woman. In one year her weight fell from 124 to 107 lbs. During this time she said that she refused to eat because people at school had tormented her about being fat. So far as known, she had forgotten the experience of witnessing parental intercourse. She became increasingly self-willed, stubborn and fussy, made a poor social adjustment at school, and on coming home went to her room and stayed there alone, saying she had "no time for social activities.'

At 15 she was studied in another hospital, where she spoke in monosyllables, offered nothing, and where it was felt that she showed "schizoid trends." At 16 she quit high school and went to dramatic school. During a prolonged cold she developed swelling of the legs and inability to urinate. In the following two years she continued to lose weight and strength.

The patient was born by Caesarian sec-

tion after 15 hours of labor. She was never breast fed because the mother lacked milk. She was the only child. She was a feeding problem until 4 months and sucked her thumb until 6 years. She was "wheezy and asthmatic" from the age of 1 to 3 and at 4 had influenza with a mild delirium. Her mother had always coaxed her to eat. At the ages of 5, 6, and 7 she had periods of vomiting, diarrhea, and weakness. At 6 she had severe measles with vomiting, mucous stools and considerable weight loss. In childhood she had been sensitive to eggs. From early childhood up to the time of admission she had shown persistent interest in her bowels, obtained great satisfaction, as did her father, from large movements, and hated to flush the toilet after using it. In her first six months she crowed like a rooster when defecating.

In school she worked hard at her studies and did well scholastically but made a poor

social adjustment.

The home life was disturbed by the clashes of many ill-adjusted characters. The paternal grandfather was an impractical, "impulsive dreamer" of whom the patient was frightened. A paternal great aunt was a recluse who had gone on a hunger strike when her father had threatened to marry a third time. The paternal grandmother was a selfish, worrisome woman who became a semi-invalid in her later life and who also stopped eating when the patient began to starve herself. The father was emotionally dependent on his mother, worried about his bowels and general health, did not make friends, was pathologically jealous of his wife, showed a strong preference for men, had premature ejaculations and occasional impotence. The maternal grandfather was an irritable man who could not get along with anyone and was a spree alcoholic. The maternal grandmother, who also lived in the patient's home, suffered from the age of 19 with "nervous indigestion" and headaches. The mother at one time had a phantom pregnancy. She divorced the patient's father when the patient was 4, married a man who was physically cruel to the patient, and who developed a psychosis, the nature of which is not known. When the patient

was 8, the mother let her first husband live with her again although they were not remarried until 7 years later and were frequently separated because of his fits of

pathological jealousy.

Physical examination on admission showed the patient to be markedly emaciated, pale, and weak. She was 5 ft. (150 cm.) tall and weighed 57 lbs. (26 kg.). Her skin was dry. Pulse was 60-92. Blood pressure was 90/70. Gynecological examination showed infantile pelvic organs. Breasts were infantile. Knee jerks were hyperactive. Hemoglobin was 72 per cent; red blood corpuscles 3,900,000; cells showed slight achromia. Kline test was negative. Blood urea nitrogen was 7 mgm. per cent. Blood sugar was 90 mgm. per cent. Basal metabolism was minus 28 per cent. Glucose tolerance and vaginal smear studies were not made. There were no other positive physical or laboratory findings.

On mental examination she was friendly and cooperative. She expressed worry about becoming resistive to gaining weight if she were made to gain before she had overcome her fear of it. She seemed cheerful but said she was discouraged because of her inability to cope with the problem of starving herself, "with the insane idea of being thin." She said that flesh was abhorrent to her, that she would rather die than gain weight. She was more comfortable when associated with fat people because she was then sure of being thinner. In the presence of thin people she felt compelled to be the thinnest. Her sensorium was clear. Her insight is illustrated by the statement, "I have a psychological twist which makes me fear

gaining weight."

She appeared interested in finding the reason for her desire to be thin and spoke of disgust over physical sexual attractiveness. She ate poorly except when closely supervised during meals, and admitted that she had slipped food into her pockets and thrown it away because she felt her physical improvement was faster than her mental improvement. Throughout her period in the hospital, discussions remained on a superficial level. She was discharged in June 1936, 5 months after admission, to be cared for at home by a nurse. Her weight at that time was $71\frac{1}{2}$ lbs.

By February 1939, there had been very little change in the patient's condition. At that time she weighed about 75 lbs., she was mixing somewhat better with others and was taking an interest in helping her mother with the cooking.

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Comment. Fear of pregnancy or the large abdomen and big breasts of a pregnant woman was a leading factor in the patient's self-starvation. It is interesting that she suppressed the memory of witnessing parental intercourse which precipitated the disorder, but instead spoke of competitive factors such as her desire to be the thinnest person in the world and to be superior in her studies, and of her wish to be attractive to men in a spiritual way because she felt that physical attractiveness made her inferior. These suggest that there was a great fear of physical contacts and that her selfstarvation was a defense against growing up. The diagnosis was psychoneurosis with obsessive and compulsive features and starvation.

Case 4. A 23 year old, single, Protestant girl without an occupation, was admitted to the psychiatric service in December 1934, after four years of inadequate diet had reduced her weight from 120 to 76 lbs.

Following her mother's death when she was 15, she became increasingly secretive and lost some of her ability to establish contacts with others. At 19, after her first year at college, a high school friend made a remark about the persistence of some mild acne, and the patient immediately began making the rounds of doctors and put herself on extreme diets, leaving out all food with any caloric value. For example, she made a meal of spinach and lemon juice. She took innumerable cathartics and would even carry a bottle of Nujol with her on picnics. Within less than a year her weight fell to 80 lbs. and her menses ceased. Because of her emaciation the college authorities would not allow her to return and for the next year and a half she studied interior decorating. She arose at 4 A.M. and removed all the furniture from one room to another and rearranged it to see the effects. She attempted a secretarial course but was advised to drop it, and after that spent her time studying cooking and diets. She continued with her inadequate diet, fussed with the servants, became restless and irritable, was incessantly moving about, resented advice and quarreled with her friends. She began to read all the advertisements, spent her days bargain hunting, denied herself necessities, and was found to have accumulated \$280 in small change at home which she had wrapped up in small bundles. For four years she had a habit of going to the toilet every fifteen minutes or so, and when driving an automobile would stop every five miles. She believed she needed to defecate every time she urinated.

She was an only child. The parents wanted a child but not at that time. The delivery was difficult and forceps had to be used. The mother had no milk and the patient was never breast fed. She was always a feeding problem, stubbornly refusing to eat when she did not feel like it. Her mother was oversolicitous and someone was always urging the patient as a child to take a little beef juice. She sucked her thumb till 6 years. As a child she had "paralysis of the bowels" when a nurse gave her an enema. At 8 she had severe diarrhea when a physician ordered her curls cut. She had two attacks of pertussis. Menstruation began at 13 and was normal until dieting began. As a child she spent much time with adults. She did well in school in all subjects except mathematics. At 15 when her mother died she showed much grief for two days. She was then cared for by a maid who told her never to tell her father anything.

She was described as even-tempered, affectionate, meticulous, forgiving, fearful of causing pain to others, and greatly attached to her mother. She always seemed to "like society and parties."

The father, a movie theatre owner, was a conscientious, meticulous man who was overconcerned about his health and put himself on a vegetable diet at one time. He nagged at the patient about what she should eat. The maternal grandfather was domineering, lived with the family, chased

the patient's mother with a knife and always found fault with the patient. The maternal grandmother was nervous, fussy and fidgety. The mother, who died in 1926 after a stroke, was tense, overactive, oversolicitous and an inveterate bargain hunter.

Physical examination on admission showed emaciation, flabby musculature, slight abdominal distention, and a liver palpable 6 cm. below the costal margin. Her height was 5 ft. 3 in. (157.5 cm.), her weight 77 lbs. (35 kg.). Pulse was 60–92. Blood pressure was 95/60. Gynecological examination revealed a small but not infantile uterus. Her breasts were atrophic. Blood sugar was 91 mgm. per cent. Basal metabolic rate was minus 4 per cent. The vaginal smears were not studied. Glucose tolerance studies were not done.

On mental examination she assumed sophisticated poses and talked with affectation and in a continual flow. She said she was usually happy. She explained her dieting as being due to a desire to cure the acne and added, "The thing to do is to set about and remove it if science can do it and you have the will and the wish." The sensorium was clear. She insisted that her tastes in food were reasonable and natural but said that she cried easily due to her

father's constant nagging.

During her stay in the hospital she talked incessantly about her dietary theories, was unpleasant and nagging in her many demands, and had difficulties with the other patients. She made many trips to the bathroom and demanded cathartics. She hoarded diet lists, advertisements of bargains and small pieces of paper, cigarette butts, bits of chewed gum and envelopes full of prunes. She put cereal in her pockets and dropped sausages inside her dress. After one tube feeding she ate better. She had difficulty in concentrating and did not discuss her problems frankly. She set 90 lbs. as her weight goal and was discharged in June 1935, when her weight reached 90.4 lbs. After discharge she gradually lost weight. After taking a strong cathartic she vomited and had diarrhea, collapsed and was brought to the hospital for readmission on September 27, 1935, and in October 1935, was transferred to another psychiatric hospital, where she made very little progress.

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half ose Subsequently she had two periods of hospitalization with improvement in her physical condition under supervision and relapse on going home. Menses did not return.

Comment. At puberty the patient began to show changes in personality. Following the death of her mother no one took interest in her until it was apparent that her physical condition needed attention. She developed excessive preoccupations about food and bowel function. Treatment was directed toward improving her physical condition since she showed no ability to develop a satisfactory rapport which would have allowed psychotherapeutic investigation. The diagnosis was psychoneurotic reaction of the obsessive and compulsive type with starvation and with schizophrenic features.

Case 5. An 18 year old, Roman Catholic college student, was referred to the psychiatric service in January 1937, by the college physician because of her marked emaciation, restlessness, preoccupation and bizarre movements.

Her dieting had started at 14, shortly after her menses had begun and she had started high school, where she resented being called plump and chubby. She lost 35 lbs. in 8 months (her best weight had been 98 lbs.) and her menses, after 10 months of irregularity, stopped altogether. At 15 people made comments that she might have tuberculosis and she began to eat again and gained 30 lbs. in 6 months. She then began to diet again, exercised violently to lose weight and at 17 developed peculiar motions of her arms and fainted several times. She began college at 18, taking courses in home economics, and planning to become a food demonstrator. Two months before her hospital admission she felt she was losing her mind and that things were distorted and did not smell, taste, or look right. She had smothering sensations which made it necessary to open windows. She complained of cramps in her legs and walked the floor at night.

Her birth was spontaneous and normal.

She was a wanted child. Breast feeding was stopped after three months because the mother had little milk. As a child she was cheerful, healthy and easily managed. From early childhood she had many mannerisms which seemed to disappear for one year after the menarche at 14. They then returned and became more severe. She always tended to quarrel with her father and looked to her mother for protection. Her work in school was good. She was moderately interested in the church but was not especially devout.

She was considered intelligent, trustful, conscientious, sensitive, dependent on others and easily offended.

The paternal grandfather was a chronic alcoholic. The father, a lawyer, was intolerant, domineering and subject to loss of temper. The maternal grandfather was quick tempered. The mother was eventempered, quiet and tolerant. The only sibling was a brother two years older than the patient, who was considered well adjusted but intolerant.

Physical examination on admission showed marked emaciation of the body but moderate undernourishment of the face. Height was 4 ft. 8 in. (140 cm.). Weight was 71 lbs. (32.2 kg.). Her skin was dry and scaly. Blood pressure was 90/60, pulse was 60-82. Knee jerks could not be elicited. Gynecological examination showed pelvic organs corresponding to the development of a child of 8. The breasts were infantile. The vaginal smear was of the atrophic

On mental examination she was composed and showed no disorder of spontaneous talk. She stretched her arms and bent her knees "to relieve tenseness." She said that at school she had worked hard and felt homesick. "I didn't feel like eating because I was nervous, I guess. I vomited and had gas sometimes. The doctors at school frightened me with all their questions. I began to think that perhaps I was queer. I didn't sleep because I got cramps in my legs and feet and had to walk to relieve them." The sensorium was clear. She said that her dieting might be due to nervousness or to an endocrine disturbance and that she needed assistance in overcoming it. quen that beca four zoat 3,00 smea norr Wit each sho and 821 193

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She showed little change until she was put under close supervision during eating in March 1937. She then began to eat better and slowly gained weight. She was reluctant to discuss her problems, frequently told falsehoods and felt confident that she did not need treatment. Her skin became normal in texture. She was given four series of treatment with estradiol benzoate in dosages varying from 1,500 to 3,000 R.U. daily. During this treatment smears showed a series of changes until a normal follicular type of smear was reached. Withdrawal bleeding occurred 5 days after each series of injections was stopped. She showed definite enlargement of the breasts and pelvic organs. Her weight increased to 82½ lbs. and she was discharged June 12, 1937.

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After leaving the hospital she received five series of 10 to 15 successive daily injections of estradiol benzoate in dosages of 2,000 R.U. In September and October 1937, when no treatment with estrogenic hormone was given, she had spontaneous menstrual periods. However, her vaginal smears were of the premenstrual type and did not reach a follicular stage.

When last heard from in February 1939, she had been working as a secretary for 5 months, was mixing better with others, felt more at ease, had very few mannerisms and was hopeful about the future. Her weight was about 90 lbs. Between May 1938, and February 1939, she had vaginal spotting on two occasions.

Comment. From childhood the patient had difficulty in getting along with her father and was excessively dependent on her mother. She was physically infantile and emotionally immature. Dieting started at the time of the menarche when she became sensitive about comments concerning her acne and being too fat. Because of poor rapport with the physician the psychodynamic development of her illness was not clear. She was fearful of having social contacts with boys and felt that their interest in girls was entirely on a sexual basis. The diagnosis

was psychoneurotic reaction of obsessive and compulsive type with starvation occurring in the setting of infantilism. Treatment with ovarian follicular hormone may have caused some improvement in genital development but it could not be said that it had any direct effect on her mental condition.

Case 6. A single, 16 year old, Protestant high school student, was admitted to the medical service on June 1, 1934, in a state of marked emaciation and weakness, after several hospitalizations elsewhere.

In May 1931, when she weighed 140-145 lbs. and was considerably overweight, her menses ceased. In August 1931, she began to think of dieting because she felt that boys did not like a fat girl. In December she fell from a horse and was unconscious or semi-conscious for several hours. In February 1932, she began to diet and in two months her weight had fallen to 128 lbs. She restricted her diet still more. By about the first of June 1933, her weight had fallen to 88 lbs. and the basal metabolism was minus 34 per cent. After being given insulin she developed nausea, felt alternately hot and cold, seemed frightened and was said to have fainted. After having been "hysterical" all night and having refused to take glucose by mouth, she was taken to a general hospital on February 23, 1934, by which time her weight had fallen to 66 lbs. X-rays showed her stomach and intestinal function to be normal.

In March 1934, glucose tolerance test was normal, using 100 gms. of glucose. Spinal fluid was negative. She received 10,000 R.U. of estradiol benzoate for 6 days and beginning April 1st, 1 or 2 cc. of A.P.L. of pregnancy urine and estrone (amniotin) two or three times a week. In May she received a small dose of adrenal cortex extract (eschatin), and developed nervousness, lassitude, complete failure of appetite, dehydration to the point of acidosis, and sharp aching pain in the epigastrium and almost complete anuria for 24 hours. With the injection of 2½ cc. of adrenal cortex extract she felt much better and had a good night's sleep.

The patient's birth was normal. She was

breast fed for 5 weeks. There were no feeding problems. Menstruation began at 13 and was normal until the onset of the present illness.

There was a tendency to be fat. She was shy and to have difficulty in getting along with others. She played with a boy with whom she swam, played baseball and rode horseback. She hated school, did not do well but kept up with her class. After a teacher had criticized her she wanted to leave school. Others teased her about being overweight. She enjoyed outdoor sports. Boys never showed any interest in her.

She was described as moderately intelligent, very self-conscious and self-interested, moody and sensitive, and strongly attached to her mother. As a child she was a tomboy. Later her friendships were con-

fined to girls.

The family history showed no gross maladjustment. The father was meek and subservient to his wife. The patient suspected him of being unfaithful to her mother. The mother was stout, cheerful and domineering. The patient had a brother 3 years her senior and a sister one year her junior, both of whom were said to be well adjusted.

Physical examination on admission showed marked emaciation, poor musculature, and weakness. The patient's height was 5 ft. 31 in. (158.1 cm.); weight was 63½ lbs. (29 kg.). Her pulse on the day of admission was 88. Several days later it had fallen to 40. Her blood pressure was 72/54. Red blood corpuscles were 5,080,000. Hemoglobin was 105 per cent. Blood sugar was 103 mgm. per cent. Basal metabolism was minus 40 per cent. The vaginal smears were interpreted as indicating a slightly atrophic condition. The clinical diagnosis was Simmonds' disease.

On mental examination she appeared depressed and was somewhat tearful but answered questions promptly and to the point. Impatience was shown when she was asked about the sequence of events. She told of being somewhat bothered by excess weight and of determining to diet, and said that it almost killed her at first. No more success in her social ambitions was attained when she lost weight. She remarked that she was "fairly plump" when she weighed 100 lbs. Forcible feeding distressed her greatly. When food or other subjects for which she seemed to have a disgust were mentioned she made a wry face and protested vigorously. She found that it had become difficult to eat even when she wished to do so. A psychiatrist felt that her reaction to the taking of food was "open to the suspicion of being neurotic." Previously another psychiatrist had not believed she had any psychiatric

reason for failing to eat.

In the hospital there was no improvement in her weight. She received adrenal cortex extract I cc. daily and sodium chloride up to 6 gms. by mouth. Beginning Iune 11th she was given anterior pituitary growth hormone (Squibb) which was gradually increased from 5 R.U. to 40 R.U. daily. She was also given vitamin B and syrup of hydriodic acid. She complained of fullness and tightness of the abdomen and moderate abdominal pain. On June 22nd she had symptoms of pyelonephritis. She became more uncooperative. On June 27th she attempted to sever the vessels of her right wrist with a nail file and later those of her left wrist with pieces of a drinking glass. She said there was "no use in living" and told of disposing of food and fluid without ingesting it. Tube feeding was used. She became excitable and overtalkative and had ideas of persecution. She died on July 14th, 12 hours after a transfusion of 100 cc. of citrated blood was given.

Autopsy was performed 6 hours after death. The uterus was small in size. The ovaries appeared underdeveloped on examination by Dr. George N. Papanicolaou. Their inner surface was white, slightly wrinkled and on section showed numerous partially developed follicles. On microscopic examination there was much fibrous tissue and only one medium sized follicie which was not close to the ovulation point. Several primary ovocytes were seen. The pituitary gland was reported by Dr. R. A. Moore to be normal except that eosinophiles were small and poorly granulated. The basophiles were in the usual number and showed a normal appearance.

The anatomical diagnoses were malnutrition, bilateral pyelonephritis, cystitis, thrombosis of left internal and common iliac pulr vent asci lowe

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iliac veins, thrombosis of cavernous sinuses, pulmonary infarcts, dilatation of the right ventricle, passive congestion of the liver, ascites, bilateral hydrothorax, edema of the lower extremities, and purpura.

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Comment. This patient seemed to feel the necessity of winning a place in the family circle. She had a strong attachment to her mother and feelings of antagonism toward her father. As a child she was boisterous and impulsive. She started on a diet because she disliked fat people and wanted to have more social life. She became interested in diets and developed a ritual of eating. There were periods when she became excitable and tended to withdraw from social contacts.

Whether her emotional or physical symptoms were of primary importance was not clear until autopsy. The diagnosis of Simmonds' disease had been favored, but in retrospect it appears that she was suffering from a profound psychoneurosis. Refusal to eat was at first on a voluntary basis and required that she overcome her appetitie. When secondary metabolic changes had occurred she lost her appetite and had difficulty in absorbing nourishment. Her psychotic episode before death was of a delirious nature due to the organic condition. Previously she had shown a psychoneurotic reaction with compulsive, obsessive and depressive features.

Case 7. A 34 year old, married Jewish housewife, was admitted to the medical service in February 1933. Since 1923, when she was 24, there had been a tendency to lose weight. Her weight had varied from 138 to 68 lbs. She ate excessively but retired to the bathroom and induced vomiting. At intervals she had pain in the left hip which more or less disabled her. During periods when she was "unable to walk" she had been observed to forget and walk normally. Menstruation ceased in 1931 when her weight was 70 lbs. Sexual

desire gradually decreased. She had frequent micturition, falling out of the hair of the head, and increase of hair on lips, chin, arms, and legs.

She was small at birth and was not breast fed. She was always thin. Headaches began at 23 and continued except for disappearance during two pregnancies. Menstruation did not begin until she was almost 19. It occurred every 4 or 5 weeks, lasted 3 or 4 days with a scant flow.

During childhood she had conflicting feelings toward her mother. She showed craving for affection and solicitude as well as irritability and resentment for the mother. She was married at 23. Toward her husband she was often abusive, fault-finding, and made many threats of suicide. Following these outbursts she usually became penitent and made declarations of love. She had three children, aged 10, 7, and 5. At 24, following the birth of her first child and the death of her mother, she began to have bitemporal headaches which she utilized in dominating the family and as an excuse for emotional outbursts.

She was described as supersensitive, hypercritical, secretive, despotic, subject to outbursts of violent temper, untruthful, ambitious to make a big impression, and craving of attention.

Her mother was the most dominant person in the family. There were two older brothers and one older sister, all of whom were said to be well adjusted.

Physical examination on admission showed emaciation, hypertrichosis, and spacing and punctate atrophy of the teeth. Her height was 5 ft. 3 in. (157.5 cm.) and weight 83 lbs. (37.7 kg.). Her pulse was 80. Blood pressure was 98/70. Basal metabolism was minus 4 per cent. The uterus was small. The vaginal smear was of the mild atrophic type. A diagnosis of Simmonds' disease was suspected.

Throughout the mental examination the patient gave the impression that she desired to appear as a great sufferer and by means of her illness and behavior to make her family, especially her husband, unhappy. She said that she had no other trouble than headaches except for the pain in the left leg. Her prevailing mood was one

of cheerfulness but at times she wept easily. A psychiatrist felt that she was psychoneurotic but did not recognize the primary significance of self-starvation as the leading feature.

She was given a high vitamin diet and injections of anterior pituitary growth hormone from March 24th to April 11th in doses of 1 R.U. and increased to 10 R.U. daily. She improved subjectively without gaining weight. She was discharged May 8, 1933, 2½ months after admission. On September 29, 1933, at her insistence, injections of anterior pituitary extract were resumed and continued until November 21, 1933. She had a rapid gain in weight which did not reach its peak until long after the treatment was discontinued. Saline solution was substituted in November 1933 for the pituitary extract. In March 1934 when the saline injections were discontinued she weighed 105 lbs. and then had a precipitous loss of weight. Menstrual periods had occurred in January, February and March. On March 15th vaginal smear showed normal menstrual bleeding. In spite of the use of pituitary extract from April to October 1934 up to five times the original dose, there was no improvement in weight and menstruation disappeared. In October 1937, she weighed 80 lbs. She had continued to have violent outbursts of temper and tended to withdraw from social contacts.

Comment. The patient's personality was conditioned by unfavorable home influences. She had developed marked emotional instability, inferiority feelings and compensatory exaggerations and craving for attention and praise. Following the death of her mother there was an accentuation of personality defects and marked psychoneurotic use of physical symptoms to dominate her husband. Although at first it appeared that she made a response to treatment with anterior pituitary extract, continued response on saline and failure to respond on resumption of the treatment, combined with the finding that she induced vomiting, made it clear that her illness was not Simmonds' disease. The diagnosis was psychoneurotic reaction of the obsessive and compulsive type with hypochondriacal overconcern and starvation.

Case S. A 26 year old, married, Protestant housewife, was admitted to the medical service in June 1933, because of marked weight loss. In the fall of 1929, before her approaching marriage, her mother refused to allow her fiancé in the house. At that time she lost her appetite and began to lose weight. She was married in 1930. She stated that marital relationship was satisfactory. In 1931 she and her husband went to live with her mother. They felt the antagonism in the home and moved to an apartment of their own. The patient felt upset by the progression of her mother's mental illness, lost more weight and became increasingly weak.

As a child she was strong. She had enuresis until the age of 8, was afraid of the dark and had episodes in which she would awake finding herself lying under the bed. Menstruation began at 11. In 1924, at the age of 17, she was hazed by being placed in cold water while asleep. Menstruation then became irregular, painful and diminished in amount. In the spring of 1931 after an appendectomy and removal of one ovary, menstruation ceased.

In school she was bashful and panicky when she had to recite. Discipline was strict. Social contacts were curbed. She got along well with her brothers. Her appetite was always "temperamental" and she tended to be constipated.

She was described as being sensitive, quiet, interested in reading, and poor at making friends.

The patient's mother was an emotionally unstable woman who opposed the patient's marriage. In 1935 the mother developed a psychosis, probably of depressive nature and was taken to a mental hospital where she died in June 1937. The patient's father supported her marriage. She had two older brothers who tended to be thin. One of them lost weight when his mother died and his wife became ill.

Physical examination on admission

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showed marked emaciation. Her height was 5 ft. 6 in. (165 cm.) and her weight was 77 lbs. (35 kg.). Pulse was 70; blood pressure was 98/68. Gynecological examination showed a normal cervix; the uterine fundus and adnexae could not be felt. Blood sugar on May 15, 1933, showed fasting 67 mgm. per cent, ½ hour after glucose 165, I hour after glucose 200, 2 hours after glucose 143. Basal metabolism was minus 15 per cent. Assay of 24 hour urine for ovarian follicular hormone yielded none. Vaginal smear was of the atrophic type.

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On mental examination she complained of weakness and progressive loss of weight, and said that she did not eat because she had indigestion if she did. She stated that she had not been well since the hazing incident, following which she woke up nights, could not call for help and thought that she would die. At times she felt discouraged. She was disturbed by her mother's attitude toward her husband and worried about her father who had been ill for 8 months. A psychiatrist reported, "While neurotic in the sense of being intense, it does not appear that this is a leading feature."

While in the hospital (June 8-25, 1933) she received 5 units of insulin before each meal, which was followed by a voracious appetite. She was given injections of anterior pituitary growth hormone. Her weight had increased to 105½ lbs. by November 1933. Vaginal smears changed from the atrophic to the normal adult type and she resumed regular menstruation for the first time in 10 years. In August 1934 her periods again ceased. In June 1935 she gave birth to a normal female child weighing 6 lbs. 111 oz. In August 1935 her menses returned with a frequent profuse flow. They became regular in November 1935.

In March 1937 the blood sugar tolerance curve was normal with values as follows: fasting 81 mgm. per cent, ½ hour 136, I hour 133, 2 hours 83, 3 hours 60. She stated that she felt better than she had in 15 years. In March 1938 her weight was 103 lbs. When last seen in July 1938, her weight was 100 lbs. At that time she was somewhat worried over the illness of her daughter.

Comment. The patient's psychoneurotic reaction appeared to develop as a result of a shock sustained when she was hazed in college, with further development of symptoms due to the mental illness of her mother and a difficult family situation. The diagnosis was psychoneurotic reaction with anxiety. Obsessive and compulsive features were not noted.

Case 9. A 32 year old, single, Protestant personnel worker, was admitted to the medical service on March 2, 1936, because of emaciation, edema and weakness.

In 1929, at 25, when she had been teaching school, she had loss of appetite. She had found the work uninteresting and was incapable of exercising discipline. In 1933 her appetite became very poor and her weight dropped to 118 lbs. There was a gradual swelling of the body and progressive loss of strength. She took cathartics to the point of having eight stools a day and she had not had a formed movement in years. Her basal metabolism at this time was minus 25 per cent. In 1935 there was less edema but progression of the weakness. Her weight had fallen to 90 lbs. She developed a craving for fluids and had dizziness which was relieved by walking. She continued to lose weight, had cramps in the feet, had difficulty in sleeping and became restless, irritable and depressed.

From the age of 5 to 8 the patient had "running ears" every winter. At 14 she had chorea lasting 5 months. After this she gained weight rapidly. At puberty she weighed 140 lbs.; at 22, 160 lbs. Before her present illness she had always been troubled with constipation. Menstruation began at 16, occurred only two or four times a year and lasted 2 to 5 days with a moderate to scanty flow.

Since childhood, diet, constipation and laxatives had been among her chief interests. She got along well with her father and was very fond of him. She had never been interested in men but stated that she would like to be married "just for a home." After graduation from college she worked successively as a sales promoter, a teacher of English, and a taster for an expert baker.

Her father had suffered from "gaseous distention." In 1933 he had dizzy spells and vomiting every two weeks on days when he ate pie and oysters and he lost 20 lbs. which he never regained. The maternal grandmother had carcinoma of the stomach. The mother took many cathartics. Two aunts had consulted physicians because of "gas formation". The only sibling was a brother, aged 28, who had been irritable and emotionally unstable and had, while under unusual emotional tension during the preceding year, suffered a loss of weight from 198 to 165 lbs.

Physical examination on admission showed marked emaciation. Her height was 5 ft. 7 in. (167.5 cm.), weight was 84 lbs. (38.2 kg.). Blood pressure was 100/60. Pulse was 80. Temperature was 95.8 F. (35.4 C.). Rectal examination showed a very small, freely movable uterus. Basal metabolism was minus 20 per cent. Urine

showed rare hyaline casts. Serum chloride was 600 mgm. per cent, total protein 5.8 mgm. per cent, serum albumin 4.2 mgm. per cent, serum globulin 1.5 mgm. per cent. Vaginal smears showed trichomonas vaginalis and were of the atrophic

type.

On mental examination the patient said that she felt fine but tired easily. She said, "I have eight to ten bowel movements. I don't call that diarrhea." She told of omitting breakfast, of having a pear for lunch and a salad for dinner. She said that with swelling of the body she had become more constipated. "Then I would take from one to ten cathartic pills and my stomach would begin to function. In about a week I would feel grand." A pyschiatrist reported that malnutrition was an outcome

of her dietary habits.

She was put on a high caloric diet and complained of feeling uncomfortable because of "tightness of the tissues." She was discharged from the hospital March 7, 1936. On April 4th her weight was 122 lbs. It was obvious that this was due to an increase in fluid. On May 26th her weight was 129 lbs. She had lost her edema. In March 1937 she wrote that her weight was 130 lbs. but that she had not menstruated. She still had puffiness of the body off and on, a variety of nervous and gastro-

intestinal symptoms, and excessive intake of cathartics.

Comment. There was a family history of excessive preoccupation with gastrointestinal functions. The patient's physiological immaturity was shown by infantile pelvic organs and menstrual irregularities. There was lack of sexual desire and little interest in men. It was evident that her dietary regime was part of a deep-seated psychoneurosis. A detailed study of the psychodynamics was not carried out. When put on a simple dietary regime she gained weight and was able to resume active work. However, many of her symptoms persisted. The diagnosis was psychoneurotic reaction with anxiety, compulsive and depressive features. Recovery on diet alone excluded an organic lesion.

Case 10. A single, 19 year old, Roman Catholic high school student, was admitted to the Thyroid-Endocrine Out-Patient Department in October 1935, complaining of amenorrhea of 10 months' duration. In November 1934 menstrual bleeding became scant and in January 1935 ceased altogether. She began to worry when she was told that she might have tuberculosis or an internal hemorrhage, and her weight dropped from 145 to 120 lbs.

Since the age of 12 when she had had an acute earache, the patient tended to have ear symptoms whenever she had a head cold. Menstruation began at 13 and was normal until November 1934 except that she had severe pains during the first few periods. She studied hard and had difficulty in mixing with others at school.

She was described as conscientious, quiet and serious minded. She always tended to have "nervousness over nothing," manifested by tense feelings, coldness of the extremities and excessive sweating. These attacks were particularly apt to occur in reaction to unpleasantness in the home. There was a tendency to be constipated and she took frequent cathartics.

The father drank to excess and the pa-

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dis aw tient showed resentment to him. Frequently there were quarrels at home during which the father used physical violence on the mother. The mother was said to try to keep peace in the family and to have obtained little satisfaction out of life. A younger sister was tense and had physical complaints without an organic basis being found.

On physical examination on admission the patient was thin but her build was feminine. Her height was 5 ft. 6 in. (165 cm.), weight 120 lbs. (54.5 kg.). Blood pressure was 108/82. Pulse was 68. Basal metabolism was minus 25 per cent to minus 30 per cent. Glucose tolerance test on May 18, 1936, was fasting 83 mgm. per cent, ½ hour 118, 1 hour 104, 2 hours 92, 3 hours 58. Vaginal smears were of the atrophic type.

On mental examination she was quiet and cooperative. She said she had not been concerned about being overweight but showed anxiety and depression about the difficulties at home. A psychiatrist said that her poor appetite was secondary

to anxiety.

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Commencing in January 1936 she was given thyroid extract. Her weight fell from 120 to 96 lbs. from October 1935 to February 1936, when the thyroid was discontinued. She was then given 16 injections of 10 R.U. a day of anterior pituitary growth hormone. By January 1937 her weight had increased to 118 lbs. She had spent the summer at the seashore, enjoyed herself and forgotten about her eating problem and amenorrhea. In September 1937 her weight was 138 lbs. Menstruation had not returned. She was enjoying her school work and mixing better with others.

Comment. Amenorrhea occurred after the patient had shown concern over the drunkenness of the father and the unhappy home situation. Concern that some serious physical illness caused the change in her menstruation exerted an influence on her eating. After reassurance was given that the physical examination showed no serious organic disease, she began to recover while away from the disagreeable home setting. Loss of weight became more marked during the period when thyroid extract was administered. The diagnosis was psychoneurotic reaction with anxiety, depressive and compulsive features and starvation.

Case 11. A 24 year old, Roman Catholic cashier, is not reported in detail but is included for the sake of the endocrine data. When the patient was 18, her mother died of cancer. She had a love affair which lapsed at this time, and she "lost interest in everything and did not care to live." Her appetite became poor, but voluntary dieting was also resorted to. Her gastrointestinal symptoms included vomiting and gaseous eructations, and her bowels did not move without catharsis. She had her menarche at 17 or 18 years of age, loss of weight at 23 years, and a gradual development of amenorrhea from 22 to 24 years of age.

When examined she was thin. Her height was 5 ft. 4 in. (160 cm.); her weight 105 lbs. (48 Kg.). Her habitus was asthenic and her figure was of the adult female type. The breasts were small but contained glandular tissue. The nipples and areolae were normal. Her pubic hair was normal. Hypertrichosis was not noted. The external genitalia were normal. The recto-pelvic examination showed the uterus to be of normal size. The vaginal smears showed secondary amenorrhea. At 26 years of age, when her weight had reached 116 lbs., she

resumed a menstrual cycle.

The diagnosis was psychoneurosis with depressive and compulsive features and starvation.

Case 12. A 20 year old, Roman Catholic stenographer, is reported in brief. Her father was alcoholic, abusive, and violent, and her mother emotionally unstable. The latter developed outspoken symptoms of Graves' disease and subsequently had a thyroidectomy. The younger sister fasted for short periods. The emotional development of the patient was normal as far as known. She had a short-lived love affair at 18. She expressed feelings of inferiority due to lack of education and poor family background and compared herself unfavor-

ably to a younger sister. Under stress, her appetite became variable and there was a certain amount of conscious dieting. Compulsive features were not marked, but she resisted efforts to make her eat and displayed some excess of physical activity.

She had her menarche at 14, loss of weight at 17, and amenorrhea at 18 years of age. The cycle was 3-5 weeks, the flow lasted 7-8 days, and the amount was "very good." In grammar school she weighed 135 lbs. On examination, she was 5 ft. 6 in. (165 cm.) in height and weighed 84 lbs. (38 kg.). Her habitus was asthenic. The costal angle 90 degrees. There was ptosis of the stomach and kidneys. The breasts were flat but contained mammary tissue and the nipples and areolae were normal.

The examination, two years after her admission, showed the labia to be small and the corpus difficult to outline. The internal genitalia were atrophic.

She had gained in weight from 84 to 110 lbs. Menses had not returned, but the smears changed from the atrophic type to that of secondary amenorrhea. She felt more at ease and was working successfully.

The diagnosis was psychoneurosis with anxiety and compulsive features and starvation.

Discussion

Psychiatric Observations

The first five cases reported here were studied in the Pavne Whitney Psychiatric Clinic, and the last seven on the medical service. All of our patients were women, but other workers have reported cases in men. (Farquharson and Hyland, 1938 (3), Ryle, 1936 (14). T. A. Ross, 1936 (13) remarks on the rarity of its occurrence in men or in married women and feels that the name anorexia nervosa should not be given to psychotic or delusional cases, for which he proposed the name anorexia psychotica. Refusal to eat in reaction to delusional ideas is quite common in various psychoses and is of a different psychopathological nature from the starvation we are considering. Yet the borderline between neurosis and psychosis is an indefinite one and a patient may be neurotic when treated in one hospital and psychotic a year later when in another.

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We have used the term anorexia nervosa for a symptom-complex occurring in a setting of psychoneurosis rather than as a diagnosis in itself. The first six cases were all diagnosed psychoneurotic reactions with compulsive features. In the other cases compulsive features were less marked. Cases 2, 3, 4, and 5 showed schizophrenic features, but to date have not shown any further signs of a more definite schizophrenic development. In a discussion of cases I and 2 when they were presented before the New York Society for Clinical Psychiatry on April 14, 1938, Dr. A. A. Brill (1) expressed the opinion that cases of anorexia nervosa are often schizophrenic. Nicolle (7) also discusses anorexia nervosa as belonging in the classification of latent schizophrenia. Cases 1, 2, 3, 6, 8, 9, 10 and 11 showed considerable depression, and in case I there was some question whether the diagnosis should not have been depression with compulsive features. Wulff, 1932 (18) has discussed the relationship of alternating periods of overeating and self-starvation to oral drives and the manic-depressive psychosis. Periods of over- and underactivity are also seen in schizophrenia. The differential diagnosis between anorexia nervosa and Simmonds' and Addison's diseases has been discussed fully by Richardson (11), Farquharson (3) and Nicolle (7). The difficulty in recognizing the psychogenic origin of the syndrome is illustrated by the failure of psychiatrists to appreciate that emotional factors were primary in cases 6, 7 and 8.

In all our cases the reticence about

sexual topics was noteworthy. There was no case in which a history of masturbation was elicited. Most of them resented questioning of any kind but especially concerning sex. It is interesting also that in the three cases where a history of sexual trauma was obtained, one (case 3) had forgotten the experience entirely, and the other two (cases I and 2) could bring it out only many months after they had left the hospital. In many of our cases the patient's own statements indicated a strong repudiation of sexuality; certainly the results of starvation presented an excellent defense against establishing a love relation, and in case I starvation directly led to breaking off an engagement. Similar observations are mentioned by Brown in his comments on Nicolle's paper (7). He also calls attention to the symbolic significance of eating as impregnation and obesity as pregnancy. Such interpretations were also suggested by cases 2 and 3. It is also worth noting that all our cases had made a poor heterosexual adjustment; only two of them had married and of these only one made an even fairly good adjustment. Homosexual trends, however, were not prominent. All of the unmarried ones were afraid of men or boys, and feared love as a purely physical thing which they regarded as a menace to their security.

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In most of our patients there had been periods of overeating before the self-starvation set in, and they had been teased about being fat. In those of our cases where the psychodynamics were investigated best (cases 1, 2 and 3) other traumatic and more deeply seated factors were important in initiating the starvation, and the remarks about fatness were utilized as excuses, presumably to avoid touching on more painful topics. It is probably because of this displacement of emphasis by

the patients that many writers express the opinion that in no case does anorexia nervosa occur in response to an acute emotional crisis.

In seven of our patients the anorexia was a secondary loss of appetite which appeared only after they had forced themselves to overcome severe hunger. Case 1, in particular, emphasized the will power needed to persevere in her cause and the pride which she took in overcoming hunger until appetite was lost. She compared herself to an ascetic and got satisfaction in denying herself pleasure. The same features were also encountered in cases 2 and 3. The name anorexia nervosa, from this point of view, is unfortunate and misleading because it places the emphasis on the anorexia which in many patients is a result of the underlying psychic and somatic processes.

Most cases showed many compulsive and obsessive features apart from the failure to eat and along with these the usually associated personality characteristics of perfectionism, stubbornness, overconscientiousness, neatness, meticulousness and parsimony. In addition, all had marked feelings of insecurity, had high ambitions, and were excessively sensitive, seclusive, serious, shy, and dependent on others. They had all been "good" children. They were all poorly adjusted socially, had difficulty in making friends, and could not fit well even into the family unit. With their desire to avoid eating, it is to be noted how many of our patients were preoccupied with food as shown by interest in cooking and diets, studying to be a food demonstrator and working as a taster in a bakery.

Although most of our cases were wanted children, a common complaint was that they felt they were not given enough attention or felt that they were rejected or were a disappointment. Once they became thin, they made a

virtue of it and paraded their emaciation, and took pride in their uniqueness.

In every case members of the family showed neurotic disturbances. One or both parents in each case had been paying excessive attention to the functions of the gastrointestinal tract, as were many other relatives (e.g., case 9). In many cases the pattern of preoccupation with gastrointestinal functions appears to have been impressed on the patient early in life and the same may be said of concern over defecation. In some cases where enormous doses of purgatives were taken it was apparently done with the idea of hustling the food through so fast that it could not be absorbed.

The parents of our patients as a rule were not well adjusted in married life in general or to sex in particular. An abnormal attitude toward sex was shown particularly in case 2 where the father retired from his job as policeman in order to drive the patient to school so that men or boys would not have an opportunity to speak to her. Although the home situation was disturbed in many cases, in only two was this because of actual psychosis in members of the family.

Physical Observations

The physical findings encountered were emaciation, dry scaly skin, cold bluish extremities, low temperature, slow pulse, and low blood pressure. The red blood cell count and hemoglobin were all either normal or only slightly below normal. The white and differential counts were all within normal limits. The urinalyses were normal in all except case 6, who died of a pyelonephritis. Serologic reactions for syphilis were all negative. In cases where X-rays of skull and sella turcica were made no evidences of an expanding pituitary lesion were found. Cases 8 and 9 showed ptosis of the viscera and gastrointestinal tract in X-ray studies.

Amenorrhea was present in all our cases. In some, menstrual disturbances preceded the loss of weight. The pelvic examination gave evidence of small internal genitalia in all except case 8. Vaginal smear examinations were made by Dr. George N. Papanicolaou of the Department of Anatomy by the method of Papanicolaou (8). These examinations showed the atrophic type of smear (9), normally seen after the menopause, in all eight patients in which they were done. Improvement approaching the type seen in normally menstruating women was noted after the administration of estrogenic hormone. However, all except cases 2, 3, 4, 9, 10 and 12 had a return of spontaneous menstrual bleeding as their nutrition improved. Detailed observations of the vaginal smear changes have been made and will be reported in another paper. In no case did it appear that treatment with anterior pituitary lobe growth hormone or with estrogenic hormone resulted in any permanent benefit.

The basal metabolism was low in all cases except one, and ranged between -4 and -40 per cent. That these low readings were due to inanition and not to a thyroid deficiency is suggested by our experience with case 10, where thyroid medication had a very damaging effect. This finding is in agreement with the work of others.

The glucose tolerance tests in case I showed a flat curve on admission, a diabetic type of curve a year later after considerable gain in weight, and a normal curve four months later. This is in agreement with the report of Sheldon and Young, 1938 (16). Case 8 showed a diabetic curve. Cases 6, 7 and 10 showed a normal curve.

Diagnosis

In a preceding paper (11) the similarity of anorexia nervosa and Simmonds'

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disease due to organic lesions of the pituitary was emphasized and the difficulty of making a diagnosis by the usual medical approach was described. It was pointed out that starvation of psychogenic origin produces the same effects on the metabolism and endocrine system as destruction of the anterior lobe. It was concluded that the diagnosis might remain obscure until autopsy.

With increasing experience it became evident, however, that this pessimism as to diagnosis is unwarranted. To make a positive diagnosis it is necessary to focus the attention on the relevant data. These pertain not only to the endocrine and metabolic findings, but also to the family situation and behavior of the patient. These are readily accessible to observation by the physician or by the immediate family of the patient. The data are given in the

Somatic Summary Table. Many of the features were described by Gull in 1874 and 1888 (4, 5). His statement as to the occurrence of the disease in young single women is amply brought out in our patients. None of them were over 25 at the age of onset of weight loss, and in the great majority the emotional disturbance became manifest with puberty or very shortly afterward. Maladjustments, neuroses, hypochondriacal symptoms or alcoholism were almost universal among the immediate relatives. Psychosis occurred in the mother of one patient, and in relatives of two others. Overdependence on the parent, usually the mother, was an almost constant feature, particularly in the severe cases. Disorders of nutrition prior to illness were almost universal. The majority of patients were overweight at one time or another, some fluctuated, and one or two were consistently thin. Social adjustment was sometimes poor before the onset of loss of weight, usually poor by the time the illness was fully developed. Emotional development, when known, was inadequate. Gastrointestinal preoccupation and disturbances were constant in all cases. Obstinate constipation, often with inordinate use of cathartics, was the rule. Many had gaseous eructations, fullness in the epigastrium, or abdominal pain. Interest in diet, calories, and cooking was common.

For purposes of diagnosis, and prognosis as well, the patients may be divided into two groups. The first 7 patients showed substantial and permanent improvement in only one case, and this patient improved only as the result of prolonged and intensive psychiatric treatment. The last 5 patients improved with medical care and, at most, two or three psychiatric interviews. The first 7 patients may therefore be referred to as the severe group and the last 5 as the mild group. Certain differences between the two groups appear in the table. In the severe group the loss of weight occurred sooner after puberty, within two years in four out of seven cases.

The striking difference between the two groups is that loss of weight occurred as a result of voluntary dieting in the severe cases, in the face of a persistent and troublesome appetite. The dieting was often reinforced by an insensate degree of physical activity. The dieting is compulsive in nature, and any attempt to increase the intake of food was met with a violent reaction, rage, concealment of food, falsification of body weight, depression, and an interest in suicide in some cases. Other compulsive behavior is described in the case reports. In the mild group the loss of weight was occasioned by anxiety with loss of appetite which in turn was a response to an overt situation.

Etiology

Anorexia nervosa seems on first consideration an example of the simplest

SOMATIC SUMMARY TABLE

		TIC SUMMAR			
Patient	1	2	3	4	5
Age when treated	26	17	18	23	18
Age at onset of loss of weight	20	15	13	19	14
Age at onset of amenorrhea	21	161	13	19	14
Age at menarche	13	13	13	13	14
Interval of cycle	21 da.	28 da.	30 da.	28 da.	4 periods in
Duration of menstrual bleeding	3-4 da.	4-5 da.	4 da.	4-5 da.	4 da.
Amount of bleeding	Profuse	Moderate	Ceased after 3 months.	Normal	Scant
Height, cm.	159	166.2	150	157.5	140
Weight, kg.	30.4	42.1	26	35	35.1
% of normal average	58	79	51	62	_
Habitus	Asthenic	Asthenic	"Slight frame"	Asthenic	Small frame
Visceroptosis	Vertical heart	Both kidneys palpable.	Both kidneys palpable.	Narrow costal angle. Kidney and liver pal- pable.	Both kidneys palpable.
Figure before dieting	Normal	Normal	Normal	Small breasts	Normal
Breasts after dieting	Shape, nipple, areola normal. Little mam- mary tissue.	Small atrophic breasts, nipple, and areola.	Infantile	Small, atrophic	Very flat, in fantile.
Pubic hair	Normal	Normal	None	Normal	Normal
Hypertrichosis	None	None	No record	Profuse	None
External genitalia	Atrophic	Normal	Not noted	Normal	Infantile, in cluding labia
Internal genitalia	Hypoplastic	Infantile	Not noted	Slightly small	Infantile
Vaginal smears	Atrophic	Atrophic	Not done	Not done	Atrophic
Menses after recovery	Resumed	Resumed, 4 cycles, Sept. to Dec. 1937.	None to Jan 1938.	None in hos- pital or on re- admission.	Two cycles
Marital state	S	S	S	S	S
Pregnancies	0	0	0	0	0

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6	7	8	9	10	11	12
161	34	26	32	. 17	24	201
14	24	22	25	17	23	17
131	33	24 4	30	16	22-24	18
123	19	11	16	13	17-18	14
28 da.	4-5 wks.	28 da.	2-4 periods per year.	30 da.	2-3 months	3-5 wks.
3-4 da.	3-4 da.	2-3 da.	2-5 da.	3 da.	2-3 da.	7-8 da.
	Amenorrhea 3-4 mo. at a time. Scant.	Irregular after 17. Scant.	Moderate, scant.	No record		"Very good"
158.1	157.5	165	167.5	165	160	165
29	37.8	35	38.4	43.7	48	38
53	57	63	59	75	86	66
Asthenic	Asthenic	Asthenic	Asthenic	Asthenic	Asthenic	Asthenic. Costal angle
Vertical heart	Vertical heart	Visceroptosis	Vertical heart	Right kidney palpable.	Not noted	Ptosis stom- ach and kid- ney.
Normal	Normal	Normal	Normal	Normal	Normal	Normal
Barely visible on photo, are- ola present. Atrophic.	Fully devel- oped but mod- erately atroph- ic.	Normally developed but small.	Adult female	Nipple and areola pres- ent. Small. Little mam- mary tissue.	Nipple and areola nor- mal. Flat but contain glands.	Nipple and areola nor- mal. Flat but contain glands.
Normal	Normal	Normal	Normal	Normal	Normal	Normal
Present	Yes	Yes	Yes, marked	None	None noted	None
Not noted	Hypertrophy	Not noted	Not noted	Normal	Normal	4/12/37: Labia and cervix small; corpus difficult to outline.
Atrophic	Atrophic	Cervix nor- mal. Fundus not felt.	Atrophic	Atrophic	Uterus nor- mal size.	Atrophic
No follicular reaction seen.	Atrophic	Atrophic	Atrophic	Atrophic	Secondary amenorrhea.	Atrophic
v	Resumed, lapsed, re- sumed again, when emaci- ated.	Regular at times, also menorrhagia.	None as of March 1937.	None a year later.	Regular at 26 years.	None at 22 years.
S	M	M	S	S	S	S
0	3	1 after recov-	0	0	0	0

SOMATIC SUMMARY TABLE-Continued

Patient	1	2	3	4	5
Breast feeding	Unknown period	6 months	No	No	3 months
Feeding difficulties	None	Coaxed to eat age 4 to 11 yrs.	Feeding prob- lem until 4 mos. old.	Feeding prob- lem as a child. Coaxed to eat.	No record
Previous nutrition	Plump at 8 yrs., 12 yrs., 19 to 20 yrs.	Thin at 8 to 10 yrs. Over- weight at 13 yrs	Called "fat- ty" at 13. 124 lbs.	A frail baby. Average wt. 115-120 lbs.	Plump and chubby at 14.
Loss of appetite	No	No	No	No	No
Voluntary dieting	Yes	Yes	Yes	Yes	Yes
Physical activity	Excessive *	Excessive	Excessive	Excessive	Restless, exercised vio-
Reaction to increase of diet	Hid food. Vomited. Cheated when weighed. An- noyance, in- terest in poi- sons.	Became angry, Hid food. Cheated when weighed.	Tantrums. Hid food. Cheated when weighed.	Angry. Hid food.	Hid food. Cheated when weighed.
Vomiting	Induced vomiting	No	Vomiting and diarrhea at 5, 6 and 7 years.	Vomiting	Vomiting
Indigestion	No	No	No	Gas and belching.	Gas and belching.
Bowels	Progressive constipation.	Moved daily in hospital.	Great interest in bowels. Movements excessively frequent.	Felt should move every 15 minutes.	Constipation
Outcome	Much improved. Holding a secretarial jobsince discharge, (1½ years).	Relapsed at home.	Very little change.	Physical condition improved. Relapsed at home.	Better adjust ment. Weight 90 lbs.

possible mechanism connecting personality disorders with somatic functions. Whether for lack of appetite or a compulsion neurosis the intake of food is reduced, inanition follows, and all the metabolic and endocrine changes are adequately explained by the malnutrition. The most obvious defect, the amenorrhea, is known to occur in famine. Changes of the same sort which

prove to be reversible may also be attributed to malnutrition. According to Sheldon, 1937 (15) and Richardson, 1939 (11) the situation is not so simple as this. Evidence of endocrine disturbance preceding the loss of weight was noted by both observers. In the present enlarged series the data are summarized in the Somatic Summary Table. The amenorrhea preceded the loss of weight

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s weeks, then skim milk diet.	No	No record	No record	No record	No record	No record
None	Frail as a baby.	No record	No record	No record	No record	No record
"Chubby" as a child. Over- weight at pu- berty.	Always thin. Maximum weight, 138 lbs. at 24.	Maximum weight, 130 lbs. at 21.	Fat till 7 yrs. of age; thin at 7 to 14 yrs. 160 lbs. at 22.	145 lbs. at 16 yrs.	Medium as a child. 107 lbs. at 23.	135 lbs. when about 12.
No	Appetite excessive.	Yes	Yes	Yes	Yes	Variable
Yes	No	No		No	No	Yes
Restless	Excessive	Decreased	Loss of strength. Restless.	Normal	Restless	Fatigued. Walked much at times.
Screaming tantrums. Hid food.	Excitement, violent tem- per and lan- guage, threats of suicide. Clandestine vomiting.	Poor appetite. Responded well to hospi- tal regime.	Rapid gain of weight.	Regained weight on vacation away from home.	No reaction.	Resisted food.
Vomiting	Clandestine vomiting.	No	No	No	Vomiting	No
"Stomach ache" when forced to eat.	Abdominal distention.	After eating.	No	Gas	Eructations	Stomach full. gas and burn- ing.
	Very consti- pated.	Tendency to constipation.	Preoccupied with bowels. 8-10 move- ments daily.	Constipation	Requires physic.	Diarrhoea later.
No improve- ment. Died of infection.	Temporary improvement. Complete re- lapse.	Became well and bore nor- mal child.	Cured physically but remained neurotic.	In good health.	In good health.	Gained 9.3 kg Working for 1 yr.

in 2 patients, cases 6 and 10. Other disturbances of menstruation preceded the loss of weight. These consisted in delayed menarche (cases 7, 9, and 11), short cycle (case 1), infrequent menses (cases 5, 7, 9, 11, and possibly case 12), short flow of 4 days or less (cases 1, 6, 7, 8, 9, 10, and 11), and scanty flow (cases 5, 7, 8, and 9).

The ovarian insufficiency observed

by pelvic examination and vaginal smears, was reversible in varying degrees. At the time of the first examination the internal genitalia were found to be atrophic in all instances except case 11. The vaginal smears showed subnormal function in cases 6 and 11, atrophy in cases 1, 2, 5, 7, 8, 9, 10, and 12, and were not done in cases 3 and 4. This hypofunction was temporary in

some cases and persisted in others. Two of the patients who improved only temporarily had menstruation: case 2 for four cycles following estrogenic therapy and patient 7 spontaneously for three cycles. The latter menstruated at regular intervals later in spite of a relapse to a profound state of emaciation. The patients who exhibited lasting improvement were six in number. Of these, case I resumed periodic menstrual bleeding. In March 1938, when she had regained weight from 65 lbs. to 105 lbs. she resumed cyclic activity with a subnormal degree of follicular reaction as shown by the vaginal smears, usually with scanty menstrual bleeding. Her recovery of ovarian function was therefore considerable but not complete. Case 8 resumed normal ovarian function as shown by periodic menstruation and a normal follicular reaction in the vaginal smears. She then conceived and bore a normal child. In her case there was no evidence of an irreversible defect. Of the remaining mild cases only one patient (case 11) resumed normal menstruation; another (case 12) showed improvement in the original smear from the atrophic type to that of secondary amenorrhea, and two (cases 9 and 10) failed to menstruate in spite of the resumption of normal nutrition and physical health. It is precisely in the milder cases that one would expect the greatest degree of reversibility. In these, therefore, the genital atrophy and ovarian insufficiency cannot be attributed entirely to inanition.

Thus in many cases there was a disturbance in endocrine function which preceded the loss of weight; in all there was a profound ovarian insufficiency at the height of inanition, which persisted in patients in whom permanent damage would be least expected. The inanition can be considered as the sole cause only if it precedes the endocrine disturbance in all cases. Obviously this is not so. This suggests that there may be an associated endocrine deficiency in all cases.

The constant occurrence of a physical factor of some sort is shown by the body habitus which was asthenic in all cases. This has no necessary relation to the endocrine system. Possibly habitus and endocrine insufficiency are both related to a third inborn defect.

The degree of endocrine disturbance should not be overemphasized. The loss of weight within two years of the menarche in 4 of the 7 severe cases suggests that it is endocrine development as much as the lack of it which is associated with the neurosis. This is borne out by the study of the pituitary dwarfs (unpublished). These have neither skeletal nor sexual development, in other words, do not undergo puberty. They are not prone to develop neuroses except perhaps as a reaction to their inferior position in an adult world. As many of them are plump as thin. Case 5 of our series is a partial exception to this statement. She was little above dwarf stature (4 ft. 8 in.) and had infantile genitalia but some degree of development of breasts and figure. Compared with the hypogonad al dwarfs the other patients with anorexia nervosa had a high degree of pubertal development. In the first place, all of the patients except case 5 attained a normal stature, evidence of the activity of the growth principle of the pituitary. Secondly, all but this one showed adult secondary sexual characteristics in the figure and skeleton. Evidence of prior development of the breasts, nipple, and areolae was noted in all except cases 3 and 5. The external genitalia were smaller than normal in cases 1, 5, and 12; normal in cases 2, 4, 7, 10 and 11, and not recorded in the others. Of the married women, one bore three children before

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fa de si the onset of the compulsive vomiting which preceded her emaciation and amenorrhea and the other conceived after recovery. In the majority of cases the work of the pituitary and other glands of internal secretion in the production of the changes of puberty were well advanced (Figs. 1, 2, and 3).

This leaves us with the association of a neurosis with an endocrine defect of relatively mild intensity, both of which become manifest at or near puberty. According to Sheldon (15, 16) and others of the English school, the primary disturbance is emotional, "a pituitary black-out" of emotional origin. It is in fact well known that emotional disturbances can cause amenorrhea. On the other hand, the time of onset and the form in which a neurosis manifests itself might be conditioned by a defect in endocrine development. The latter would become manifest only at puberty.

The family history yielded no information on this point. Though neuroses or other psychic disturbances were extremely common, especially in the gastrointestinal system, these with a few minor exceptions, did not take the form of anorexia nervosa. In case 3 there was a history of fasting in the second generation preceding. In case 4 the father went on a vegetable diet at one time. In case 12 the voungest sister subjected herself to periodic fasting. There was no family history of an endocrine defect except in case 11. This patient had a maternal aunt who is said never to have menstruated. Judging from a series of pituitary dwarfs, however, the negative value of the family history as evidence of an endocrine defect is nil. In these cases similar instances in the family were conspicuous by their absence.

Treatment

Successful treatment of the more

severe patients has been in our experience much more difficult than that reported by, for example, T. A. Ross (13) who reported 16 out of 19 cases doing "absolutely well" on a Weir-Mitchell treatment of bed rest, isolation, full feedings, and discussions of difficulties which avoided going deeply. It is possible that our patients showed unusually severe reactions.

It is important to get the patient away from the home situation and to institute a regular regimen, using firmness but not inflexibility. Occupational and other activities and socialization are needed to utilize the time constructively and to prevent these patients from dwelling on their obsessions. As is common in psychoneurosis of the compulsive type, psychotherapeutic attempts were as a rule met with extreme resistance. These patients require much time and patience, and their undercover hostility makes it impossible or difficult to establish a satisfactory therapeutic rapport with the physician. A thorough psychobiological study should be the basis of an attempt to understand the patient and the development of her illness.

The attempt was made to uncover gradually the dynamic factors in the personality and to impart insight so that adjustments to these difficulties could be worked out. This is a long process, during which the patient becomes discouraged and needs almost constant reassurance. Emphasis was placed on a gradual resumption of a normal food intake, so that the viscera would be able to adapt themselves to the increased volume. We used tube feeding only in extreme cases where it was impossible to get the cooperation of the patient. In our one fatal case, tube feeding only aroused added resistiveness and she attempted suicide twice on the night before the tube feedings were to be increased from once

to three times daily.

In our patients, no physiological effects of the extract of the anterior lobe of the pituitary could be demonstrated. In case 6 insulin caused a powerful stimulation of the appetite, but case 8 had received it elsewhere without benefit—it resulted in attacks which could be interpreted either as "hysterical" or hypoglycemic. Thyroid extract in case 10 was accompanied by an alarming acceleration of weight loss. In cases 1 and 2 estrogenic hormone therapy was followed by physiological changes, as indicated by improvement in the vaginal smears. Although its value is questionable it is possible that in these two cases it was helpful as an adjuvant.

SUMMARY

- Anorexia nervosa is a neurosis with compulsive, obsessive, anxiety, and depressive features. Schizophrenic features are frequently noted. The distinction between failure to eat in our cases and in psychotic reactions is discussed. The complexity of the factors present in the development of this syndrome is shown by an analysis of the heredity, personality, physical make-up, and environmental situations in the individual cases. The neurosis serves as a protection against the assumption of normal sexual relationship. Instances are cited in which eating symbolized impregnation and obesity symbolized pregnancy.

Neurotic traits with special reference to the gastrointestinal tract were almost universal in the immediate family, and psychoses were not unknown. Gastrointestinal symptoms were noted in all patients. Loss of weight occurred in the severe cases as a result of conscious dieting, in the face of a lively appetite, and was reinforced by excessive physical activity. Thus the dieting seemed to be compulsive in nature and was often accompanied by other com-

pulsive and obsessive features. Interest in diets and cooking was common. In the milder cases loss of weight occurred as a result of loss of appetite. The endocrine and metabolic disturbances are due mainly to starvation and do not distinguish the cause of the inanition. By attention to these characteristics of anorexia nervosa, as described above, there should be no difficulty in making the diagnosis as against Simmonds' disease.

Not all of the endocrine defects could be explained by inanition. Disturbances of menstruation preceded the loss of weight. The continuation of subnormal ovarian function after recovery in the mild cases was also taken as evidence of a pre-existing endocrine deficiency.

In general, a latent neurosis often becomes manifest at puberty with the emotional turmoil and physiological adjustments which take place at this time. Likewise, an endocrine defect, latent during childhood, would first become manifest at puberty. The effect of a psychic disturbance in inhibiting gonadal function is well known, but whether it is the sole factor in the cases under discussion is not clear. The relation might be coincidental or causal, and if causal, might operate in either direction. In other words either the neurosis or the endocrine defect might be primary. It is not even clear that the attempt to make the distinction between cause and effect is justified. For the present the most that can be done is to call attention once more to the relationship.

Our observations emphasize the need for considering the individual as a unit while evaluating the psychic and somatic components. Treatment should be directed toward the institution of a regulated but flexible regimen and the analysis of personality features and emotional conflicts. 1. Bi Yo Pa 74, 2. Co Gu 3. F.

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ABSTRACT SUMMARY

Physical and psychiatric observations were made on 12 patients with the symptom complex of anorexia nervosa. All were found to have a psychoneurosis associated with an endocrine deficiency which became manifest at or near puberty. Obsessive, compulsive, anxiety, and depressive features were prominent. Some had schizophrenic features. In the milder cases malnutrition often resulted from failure to eat secondary to an anxiety reaction with loss of appetite. In the more severe cases hunger was overcome by voluntary dieting.

Physical findings included emaciation, dry, scaly skin, cold, bluish extremities, amenorrhea, atrophic type of vaginal smear, subnormal temperature, slow pulse and low blood pressure. Common personality characteristics were stubbornness, meticulousness, parsimony, ambitiousness, seclusiveness, shyness, dependence on others and difficulty in making friends. The patients' own statements indicated an avoidance of assuming normal sexual relationships. Frequently excessive interest by a parent in the function of the intestinal tract had been impressed on the patient in early life.

In treatment a regulated regime using firmness but not inflexibility should be instituted. Endocrine therapy has not been found to be of any definite value. Psychotherapy should be directed toward a study of the dynamc factors in the personality, re-education, and encouragement. Emphasis should be placed on imparting to the patient an understanding of the illness which can be used in making a more satisfactory adjustment.

PERSONALITY FACTORS IN NEURODERMITE—A CASE STUDY*

NATHAN W. ACKERMAN, M.D.

IT IS MY OBJECT HERE to relate the life story of a juvenile patient afflicted with a chronic skin disorder. The skin pathology was of a type which has long been considered to involve some personality factors in its production. Actually, this patient exhibited prominent pathological trends in her personality which seemed clearly related to the perpetuation of the pathological development in the skin, if not to its cause. An effort will be made to illuminate the nature of the personality problem presented by this patient, and to offer some suggestions as to the probable manner in which this patient's skin disorder may have woven itself into the mesh of her malformed personality. The discussion will limit itself entirely to the data presented by this one case and there will be no attempt here to draw any generalized conclusions as to the dynamic interrelationship of personality and the body integument.

PRESENT ILLNESS

The patient, a fourteen year old Jewish girl was admitted to Montefiore Hospital in 1934 for treatment of a diffuse rash. She complained of itching, restlessness and poor sleep. The patient had suffered from this intractable skin disorder since the age of two years. Initially, it was eczematoid in nature, and generalized over the surface of the body. This first eruption

* Published with the consent of Dr. L. Lichtwitz, Chief of the Medical Division of Montefiore Hospital, New York City. This paper was presented in condensed form at a Neurological Conference held at Montefiore Hospital in 1934. subsided completely within several months. Shortly thereafter, however, the eruption recurred, allegedly localized mainly to the face, neck and arms. During this period, the patient began for the first time to engage in considerable scratching of the skin. Since that time, the patient has scratched her body more or less continuously, and, during certain emotionally disturbed periods, indulged this scratching in a kind of vicious orgy.

At the age of six, the patient was treated in Bellevue Hospital where marked improvement occurred, but immediately on release there was a sharp exacerbation. Thereafter, she treated in several other hospitals and each time, though she showed considable improvement during her stay, severe exacerbations occurred soon after leaving the hospitals. On several such occasions she was almost entirely free of her rash but, no sooner did she leave the hospital, than the eruption reappeared "overnight". At such times, her face might one day be all but clear, and the next day be smeared over with unsightly excoriations, apparently caused directly by pernicious scratching. As a result of this scratching, the skin of the face and arms became bruised, tough and leathery. In the various hospitals, she had received every method of treatment, ointments, injections, dietetic regimes and light therapy, but this treatment did not deter the repeated exacerbations. The eruption was more severe in winter, milder in summer, and improved when exposed to sunlight and ocean water. During menses, the condition of the patient's skin was usually worse. When

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the rash was severe, the patient was markedly constipated. From time to time, the severity of the disorder varied considerably, but at no time was the patient entirely free of it.

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The patient's past medical history was essentially negative. Her health has been fairly good aside from the skin disorder, and the only other disease noted was diphtheria. There were no operations. At ten years of age, she had her first menstrual period, which lasted only two days and was without pain. However, for the next three years, it recurred only once yearly but, after the age of thirteen, became regular. Intermittently, the patient had some oligomenorrhea. She also had some disposition towards constipation. The medical history of her family was not significant in any way.

EXAMINATIONAL DATA

Physical examination revealed a tall female, overdeveloped for her age. The breasts were precociously large. Heart and lungs were normal. There was no lymphoadenopathy. Laboratory examinations showed that the urine, blood chemistry, Wasserman and Kahn were all negative. Vaginal smear was negative. The blood count showed a marked lymphocytosis up to 56 per cent, and a slight leucocytosis; no eosinophilia. The B.M.R. ranged from -21 to -1. X-rays of the skull and chest were negative. Complete tests for intradermal allergic reactions showed a strongly positive reaction only to egg, wheat and milk. She was negative to inhalants, also to wool, silk, linen, cotton, chinchilla, etc. Patch and scratch tests were negative, except for a very slight reaction to leather.

The rash affected most of the pa-

tient's body as is shown in the following report of the skin pathology recorded by the dermatologist: "Specially involved is the skin of the arms, forearms, upper part of the thorax and neck, whereas the thighs, back, and abdomen only show relatively slight or much less intense changes of the skin. The palms, soles, genitalia, lips, and mouth are free. The skin has an exquisitely dry appearance, specially lacking the moisture and oilness of a normal skin. The surface of the involved areas appears rough, the skin is generally thickened. There is evidence, particularly, that the face is an area of predilection, so that to a certain degree the impression of the 'facies leontina' results. The process of the extensive lichenification of the regions mentioned is the outstanding clinical factor in the skin pathology. It is characterized by intensified lichenlike appearance (exaggerated surface markings of the numberless little squares of the skin-Hautfelderung). The surface of these lichenoid eruptions is not shiny. This process is prevalent on areas of predilection, the face, lateral aspects of neck, supraclavicular regions and elbows. (Antecubital regions show marked lichenification.) There are no real formations of vesicles or pustules, but numerous scratch effects. On the arms, one finds, in addition to this more or less generalized lichenification, irregularly distributed single papular elements and eczematous lesions, for instance, rhagads and dry scaling. The less involved regions show only here and there diffusely scattered papular elements and slight lichenification. The scalp is dry and scaly. There is no involvement of the hair growth, eve-lashes, eyebrows, axillae and genital region. The appearance of hair is lustreless and, apparently, has not the normal content of oiliness. The skin, besides these qualities, especially in

the involved parts, and particularly the eyes, presents the characteristic, peculiar, typical grayish-brownish color".1

DIAGNOSIS

On examination, the diagnoses established were mild hypothyroidism, neurodermite, and psychoneurosis with

depression. Behavior in the Hospital: Shortly after admission, the attention of the Neuro-psychiatric Division was drawn to this patient because of her eccentric behavior on the hospital ward, which stamped her as a conspicuously disturbed personality. She was intelligent and alert, but was aggressive, rebellious and vindictive. When angry, she was literally a spitfire, abusive and profane with abandon. She was hyperactive and difficult to control. She was openly defiant and incited other children to rebellion. While the other children listened in rapt attention, she related intriguing tales of a highly lurid nature about her sexual experiences and, when opportunity permitted, flaunted herself sensually before the eyes of surrounding males, orderlies and patients indiscriminately. In certain moods, she was intensely cvnical and expressed her conviction that she could not and would not ever be cured of her skin condition. It was a lifelong curse and she didn't "give a damn" whether or not she continued to live. She often said she would "just as soon die or be killed". She was unstable emotionally, at times euphoric, at other times morose or depressed. She had frequent crying spells and at such times absorbed herself in fantasies of suicide.

Personal History: The patient was born in New York, the third in a family of four children. When the patient was two years of age, her mother died during the birth of the fourth child. Her father was unable to care for the children. A sister, six years her senior, a brother, three years her senior, and she were placed in an orphan asylum. Later, when the patient was six years of age, the younger sister, two years her junior, was surrendered for legal adoption. For the years between two and nine, the patient was irregularly boarded out in foster homes. Between the ages of nine and fourteen, except for short periods in various hospitals for the treatment of her skin, she lived in an orphan home. She assumed up to the age of nine that an aunt, who regularly visited her, was her mother. In her ninth year, she was definitely informed for the first time that her own mother had died in childbirth when she was two years of age. In the preceding two years, however, the patient had already had some suspicions regarding her mother's identity.

Intellectually, the patient was well endowed and superior to the average child. In spite of her hectic, disordered existence, she managed to do fairly well in school and displayed some special musical talents. She continued to be a bed-wetter, however, up to the age of thirteen years. At fourteen, she graduated from junior high school.

In character, she was an aggressive, extraverted tomboy. She thrilled at strenuous athletic games of all kinds and was rather daring in her play. She was sociable and quite well-liked. Although she fought with and bullied smaller youngsters, she was not unkind to them. She frequently adopted a protective attitude towards younger children. She derived some pleasure in teasing cats and dogs. Her likes and dislikes in her own family were sharply defined. She loved her father especially, but also was quite fond of her older brother. She was distinctly jealous of and hostile toward her older sister but prote youn W

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¹ Reported by Dr. Hans Field at the Montefiore Hospital Neurological Conference in 1934.

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When she was seven years of age, her brother rescued her from drowning. At eight years, because she "felt like playing with a knife", she cut her brother over the eye. At nine years, because she felt jealous, she almost stuck a fork into the head of her older sister.

The emotional development of this patient divides itself significantly into three periods: From birth to two years, from two to nine years, and from nine to fourteen years. About the first period, almost nothing is known. During the second period, when she was boarded out in foster homes, she was treated affectionately by her foster mothers, and was consistently obedient. She was regularly visited by her father and her aunt, whom she regarded as her mother. They showered her with affection and she was quite fond of them both. She was not at this time very much troubled consciously about her skin. Up to the crucial age of nine, she was moderately content and well-behaved. She was well disciplined and conscientious in her school work.

During the ninth year, however, a series of personal and circumstantial vicissitudes ushered in a complete metamorphosis of the entire emotional life of the patient. Prior to that time, the patient had already been upset emotionally by the legal adoption of her vounger sister. Since she believed her mother to be alive she was puzzled by it and unable to assimilate the need for such adoption. She was especially troubled because she felt tenderly protective towards this younger sister and had fantasies of recovering the sister from her foster parents and returning with her to live with her father. Notwithstanding this conflict, her attitude and behavior did not radically change until the age of nine. For the first time she became aware that her aunt had other children but of still more importance was the fact that at this time she had several vivid dreams to the effect that her real mother had died. She was unable to divest herself of the suspicion that the dream told the truth. On questioning her aunt, she discovered that her surmise was well-founded. She was puzzled as to why the knowledge of her mother's death had heretofore been withheld from her. She mulled thoughtfully on the entire situation and came to the conclusion that she, herself, must have been the cause of her mother's death. She could not otherwise account for the obvious contradictions, and this last conclusion was for her the only logical explanation of everything. As an immediate consequence, she became more distant to her aunt. Moreover, since she felt now that she had no mother, she believed her father would no longer care for her. She felt that his affection for her was rapidly waning. She said: "Before that, I loved him and he loved me. Afterwards, everything changed—life changed".

With this extensive transformation of her entire life attitudes, her feelings towards herself, her family, society and mode of living, assumed an utterly new aspect. She thought, since she had caused her mother's death, she too must soon die, and she began to preoccupy herself with suicidal fantasies. Her skin malady became the curse of God for having killed her mother. Having heretofore been a well-behaved girl, "an angel", in point of fact, she abruptly gave way to the devil. She deliberately decided to be as bad as she could possibly be—the quicker the better. She set out with determination to be contrary, spitefully rebellious and vindictive. She imagined herself a criminal, and anticipated a full measure of punishment, even to the point of mutilation of her body. Each punishment in turn would incite in her a further misdemeanor—a vicious circle. Her interpretation of the menstrual function was in harmony with the above pattern of thinking. She regarded it as probably being eczema of her genitalia, the bleeding, as on her face, coming from excoriations. This, too, was punishment. She said to herself again and again that there was no need for her to be good if she had no mother. She became a troublemaker, wayward and vicious. She no longer "gave a damn".

Being bad to her meant being bad sexually. She launched with deliberate, conscious purpose on a career of sex. She courted sex in its every morbid guise. She identified herself with a girl inmate, notorious for her versatile sexual antics, and proceeded to try to outdo her. She was frankly jealous of this girl's capacity as a whore. At the age of ten years, she invited her first sexual seduction, but made it seem as though she had been assaulted. She witnessed all types of sexual perversities and actively indulged in some of these. Although she did not masturbate, she played with her breasts. Between the ages of ten and fourteen, she indulged with morbid pleasure in all manner of sexual experiences. She enjoyed teasing boys, exhibited herself proudly. She was aware that her sexual proclivities would inevitably invoke severe punishment, but seemed to welcome it.

From still another tangent, the patient did penance to her dead mother. She became fearful lest she be visited at night by the ghost of her mother and often lay awake waiting apprehensively for the ghost to appear. Twelve years ago her mother was a patient at the same hospital and the patient was often sleepless at night wondering if her mother had, long ago, lain on the same bed—even on the same mattress.

She was insistent upon making her own bed and was meticulously cautious about covering every part of the mattress before she got into bed. Often, she sought for evidence of blood stains on the sheet and, if she found such stains, became quite frantic until she was able to obtain a fresh, unspotted sheet. Moreover, she became fearfully sensitized to the hospital morgue. To walk past the door of the morgue was a horrifying experience for her. She feared a ghost might run out, seize and eat her. If the key was in the door, she felt an almost irresistible temptation to rush up, lock the door and dash off with the kev.

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Her relationship toward her father underwent a strikingly significant change. Up to now, her father had been quite demonstrative in his love, kissing her all over her face and lips. She now shunned his kisses and, when he did kiss her on the lips, she experienced an annoying impulse to sterilize her face. She thought she might get hydrophobia and, also thought her skin erupted more viciously following his kisses. It is of interest to note that her later reaction to boys was a similar one-although she submitted freely to sexual intimacies she did not permit her face or lips to be kissed. She thought her skin might get worse or perhaps they would contract the disease. She then began to dream repeatedly that she killed her father, and out of this dream emerged a fear both of the dream itself and of her father. Notwithstanding this fear, she indulged in conscious fantasies comprised of plans for killing her father. The reason for killing her father was that whenever she considered killing herself thoughts of his miserable loneliness immediately entered her mind. Therefore, the only satisfactory solution was first to kill him and then herself. She toved continuously with the idea of suicide, on one occasion cut her wrists and, on another occasion, hung precariously from a window ledge six stories high. At still another time while submitting to some sexual advances, she careened recklessly over the edge of the roof as though inviting a fall. She wished either to kill herself or to become so intolerably bad as to incite someone else to kill her. Moreover, she fantasied executing all sorts of weird, horrifying crimes to be duly followed by imprisonment and electrocution.

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Last, and of great significance, is the rôle of her skin in her psychopathology. It is to be recalled that the skin of her face, neck, upper thorax and arms showed numerous excoriations. These deformations were caused by habitual scratching. Usually, she was not satisfied to cease scratching until her skin had begun to bleed freely. Her skin seemed to itch most when she felt "nervous", "guilty", or "very mad". She described herself as a girl "who wants what she wants when she wants it". If she doesn't get it, she gets very mad, her face gets red, her blood "circulates too fast". Ther she has a "fit of spite". At such times, she scratched with great venom until thoroughly tired, and then she felt relieved. In such moods, she was at first intensely angry towards the people who had thwarted her, but, when the fit of scratching was finished, she had a satisfied sense of relief and her anger toward these people then subsided. It is quite clear that in these moods, scratching provided a very important outlet for her choked feelings. She simply continued to scratch until her roused emotions were assuaged. Sometimes she scratched to the point of exhaustion and, at this point, her emotional torment dissolved and she was once more at peace with herself.

Other circumstances under which this scratching was manifested excessively were when she was excited by thoughts of guilt regarding the death of her mother, moods in which she was influenced by fear of her father or preoccupied with dreams and thoughts of killing her father and herself. Still another important emotional state which stimulated an excessive indulgence in scratching was that of sexual excitement. She would scratch until these feelings were relieved. When she was passionate, she felt that her whole body tingled, then she scratched and she would then begin to feel warm all over her body. Her "blood got warm". After a bout of such scratching, she felt better. This was especially the case in those periods in which she played with her breasts. It will be remembered that when she first began to menstruate, she imagined the bleeding was caused by a similar skin eruption in her genitals. The patient always felt that sexual interests or activities of any kind were abhorrently dirty and felt deeply ashamed of her own intense interest in sex. The patient herself said that the sense of shame regarding her sexual feeling had something to do with this excessive scratching.

At nine years of age, following the important turn in her life tide, she was convinced that her skin malady was a major curse of God, inflicted upon her for the murder of her mother. Moreover, she believed her father's kisses caused her skin to become worse. Her father was self-conscious when seen with her but told her over and over again that he would take her to many pleasing places when her skin cleared up. The patient felt that he avoided her because of her hideous skin, but actually it was she who avoided him. She, therefore, had the firm conviction that she could never hope to be rid of this skin disease and began to feel that it set up a barrier to all human relationships. She felt that all people shunned her and that, wherever she went, people recoiled from contact with her or avoided even nearness to her for fear of contagion. At one time, a woman who had befriended her offered to take care of her in her own home, but added the reservation "when you get better". Many other people, who might have shown her fondness, disliked her because of her skin. This denial of affection made her extremely bitter. Even children called her "scratchy", "lousy", "rat poison", and a host of other disgusting names which she carefully collected in her diary. Out of these experiences, emerged an expansive feeling of rejection, personal injury, and a painful sense of human isolation. She was so mortally hurt that in her day-dreams she substituted other punishments for that of her skin. She fantasied herself horribly crippled but with a clear skin and favored with love and companionship. Many times she imagined herself a mere torso, without arms and legs, but with a normal skin. Such was the curse of God a just reprisal for the murder of her mother.

Addenda to the History: The patient showed slight betterment of her skin condition with medical treatment. Later, with intensive psychotherapy she showed simultaneous improvement of considerable degree in both her behavior and her skin. Some time after her discharge from the hospital it was learned that she had become an unmarried mother.

DISCUSSION AND SUMMARY

Our immediate object here is to try to specify the rôle of the patient's skin disorder in the evolution of her total personality. During her period of observation in the hospital, the patient exhibited fluctuating tides of anxiety some hysterical tendencies, and some waves of mood predominantly in the direction of depression. The question is how she developed these disorders, and what part the skin pathology constitutes in the total pathology of her personality. In order to understand this, it is necessary to weave together into unitary patterns the life experiences of the patient and her reactions to them.

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Nothing is known of the patient's primary relationship to her mother in the first two years of her life. The era of the third year of her life is a most important turning point in her whole development. Up to this time, the patient, who had been the baby in the family, was abruptly separated from the mother for the period of the birth of the fourth and last child. This supposedly temporary separation became permanent when the mother died in childbirth. About this time the patient had her first skin eruption and it is plausible to assume that, at this stage of her life, there was considerable emotional disturbance. However, one can only speculate upon the nature of this disturbance. From later developments in the patient's life, it may be inferred that she reacted sharply to the sudden privation of maternal love, felt hostile to the mother, and resented the intruder who was to displace her as the baby in the family. Whether unconscious death wishes for the mother were actually present or whether the patient's unconscious hostility to her mother was retrospectively crystallized into the express form of a death wish are matters of conjecture. In any case, it is certain that the patient felt intense unconscious hostility toward her mother, and it is altogether likely that she reacted with considerable jealousy and antagonism toward the new-born sister. That this hostility was transformed subsequently into a protective, maternal attitude toward the sister is probable. Whatever the exact nature of these emotional conflicts, it is quite conceivable that the patient at two years of age anticipated some form of punishment for her hostile feeling. The question naturally arises —Did the skin disorder serve at this early age as a psychic representation of punishment? From the evidence at hand, it is, of course, impossible to say whether the first attack of this skin malady at two years was purely a biological accident, or whether it was primarily related in some subtle way to the patient's then existing emotional conflicts. In either instance, it is definitely known that the patient began to scratch her skin in a severe way shortly after the onset of this skin disorder. One could conservatively assume that the first eruption was purely a biological accident, a simple infantile eczema which, in its natural course, subsided in a few months. On the other hand we know now that even infantile eczema may have an important emotional component. In any case, the recurrence of the eruption in a modified form and its perpetuation thereafter as 'Neurodermite' seem definitely related to the persistence of vicious scratching activity. We may hold tentatively that from this point on, the relationship of the skin pathology to the total pathology of the personality is paralleled by the proportionate significance of the patient's self-destructive scratching activity to the rest of the total personality.

In any case, it seems logical to assume that the emotional development of the patient from the ages of two to nine was modified by a need to achieve a solution of these early difficulties. What sort of solution did the patient endeavor to reach in this period? In the first place, one cannot safely assume that the patient had no knowledge whatever until nine years of age of her mother's actual death. There is

much evidence for the belief that the patient had actually been aware of her mother's death, but that the painful affect associated with this knowledge was profoundly but temporarily repressed. Even if one were to accept the patient's allegation that she had no awareness of her mother's death, it would still be necessary to assume at least that the patient had sharply repressed her hostilities to her mother. In association with such repression, the patient made an effort to gain emotional security through the adoption of a mother substitute in the form of the aunt. During this period she was quite well-behaved, and obedient and avoided giving offense to her aunt or to any of her various foster mothers. It is noteworthy that the patient's attitudes toward other members of her family had already assumed distinct patterns she deeply loved her father and older brother, but hated the older sister, and was protectively maternal toward the younger sister. This type of submissive adjustment probably reflected her dependent strivings, her effort to deny her hostilities to mother persons, and there is the further inference that she was unconsciously endeavoring to displace the mother as the father's love object. In this phase there are some hints of motives of expiation, with the hope thereby of eventually gaining her end with the father. Nevertheless, in spite of the patient's prodigious efforts to submerge her anxieties in this period, she did have definite feelings of insecurity.

At 9 years the above patterns of emotional adjustment suffered acute disorganization. Probably the first event which brought about some degree of weakening of her defense mechanisms was the legal adoption of the younger sister. This event caused her much distress, and probably signified for her a rejection of the sister and, both directly and by identification, a rejection of herself. In all likelihood, the necessity of seeing this event as a rejection once more roused the patient's unconscious hostile drives. Later, two other events made inevitable the final surrender of the patient's false belief that her mother still lived—one, the objective reality that her aunt had children of her own, and the other, the subjective reality of the patient's dream telling her of her mother's death. With the collapse of the patient's repressions, she became dominated by the conviction that she herself had caused the mother's death. This highly significant turning point completely upset the previous balance in the patient's personality, and ushered in a new, and more severe type of emotional maladjustment.

At this time the patient began to display open hostility to the aunt, and was literally mowed down with guilt over the supposed murder of her own mother. She was convinced, therefore, that she must be punished by the ghost of the mother. Her skin affliction became for her such a punishment. But this was not enough—in order to fully expiate her crime she must kill herself, or incite some one to kill her.

In relation to her father there came another tragic turn. She had the wish to capture the father's love, and with him to provide for the care of the younger sister. Since she was the murderer of her mother, however, he could not now give her his love; in fact, he must now loathe her. Here her disfigured skin played a significant rôle as a barrier between herself and her father and strongly reinforced the incest taboo. Also, she might thus punish the father by infecting him with her diseased skin. Since she was thus thwarted, she wished to kill first him, and then herself.

Since she could no longer conceal her heinous crime and now felt the futility of gaining love, she might just as well be a bad girl to the very last ditch, and she was. Turning from "angel" to "devil" meant two things: 1) to hate and to hurt everyone, and bring about her own eventual destruction; and 2) to taste of all the forbidden pleasures while she vet had time, really to have a last fling in life. In this period, she was intensely destructive and vindictive, and flirted openly with her own death. This behavior brought into sharp relief her sado-masochistic character. There can be little question that the scratching of her skin was a significant expression of self-punishment and with this was closely associated a medlev of other self-mulitative phantasies.

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In this period, her drive for pleasure was of a highly morbid character. The pleasure she sought was mainly sexual in spite of her feeling of tremendous guilt. She suppressed her overt masturbatory urges, but played with her breasts, and then usually punished herself with an orgy of scratching. It is interesting that the scratching activity itself became a means of intense sexual excitation, a substitutive masturbatory activity. In view of the frustrated love for her father, her flagrant seductive drive toward men was highly significant. She was intent on winning them to her, no matter what the cost, and her methods were ruthless and outlandishly crude. Simultaneously, she treated these men cruelly, presumably to avenge her father's rejection of her. At the same time she punished herself for these offenses through scratching and other self-destructive impulses. In this connection, it is of great interest that the patient should finally have become an unmarried mother. She had her way with men, but only at the price of social degradation.

The disfigurement of the patient's skin represented a barrier to all human relationships. It is perhaps justifiable

to assume that the patient had a need to make herself as hideously unattractive as possible, because of her extreme guilt, and her profound chagrin at being unloved. Therefore, she systematically ruined the appearance of her face through scratching. It is especially noteworthy that in those all too brief periods when the patient received a good deal of solicitous interest and affection, she showed remarkable improvement in the condition of her skin.

It is to be seen throughout that the dominant note in this patient's life was hate of others, and hate of herself. Since she hated herself, she made herself repulsive in order to compel all others to hate her. Therefore, the marring of the skin would have special significance in making her as ugly as possible—so ugly, in fact, as to bar her from the father's love, and perpetually remind her of her phantasied killing of her mother.

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A METHOD FOR INVESTIGATING THE EFFECT OF REPRESSION ON THE SOMATIC EXPRESSION OF EMOTION IN VEGETATIVE FUNCTIONS: A PRELIMINARY REPORT

Jule Eisenbud, M.D.*

CLINICAL OBSERVATIONS

EVER SINCE CANNON (4) demonstrated that in cats the bodily manifestations of emotional processes are predominantly those mediated by the sympathetic branch of the autonomic nervous system, there has been a certain amount of confusion in medical psychology because observations of humans in emotional states oftentimes have failed to conform to the patterns described in cats by Cannon and, insofar, have seemed to fall outside the concept of strict teleological homeostasis as developed by that author. Kuntz (13) has shown that in humans mixed syndromes are frequent, and has thrown doubt upon the original theory of reciprocity and mutual exclusion between the two divisions of the autonomic nervous system. Kling (12) has found that in humans parasympathetic symptoms tend to predominate in certain emotions, notably fear, and concludes that a double excitement and a mixture of symptoms is more the rule. Flynn (8) found that the physical signs and symptoms in twenty psychoneurotic patients were "similar to those which one would expect from stimulating the parasympathetic division of the autonomic nervous system".

It has recently been shown by Bender (1), working with cats and monkeys, that in an emotional state such as fright there is a general discharge of the autonomic nervous system with the secretion of both "ad-

renergic" and "cholinergic" hormones. This investigator has shown, moreover, that animals of different species differ in the predominating type of response to fright and rage stimuli. On the basis of his observations on the leech, frog, cat and monkey he has suggested that the lower the animal in the phylogenetic scale, the greater its predisposition to cholinergic effects.

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Psychiatric investigation of physical symptoms in emotional states in humans tends to confirm the general impression of the frequency and importance of parasympathetic excitement, man's phylogenetic preëminence notwithstanding. Deeper investigation, however, has led to the hypothesis that the relation between sympathetic and parasympathetic excitement in emotional states is not as haphazard or as confusing as it might first appear, but it is a describable function of certain knowable variables, not the least important of which is the organism's exercise of the function of repression, or, in other words, its exercise of the capacity to put an idea or constellation of ideas beyond the range of conscious perception. The hypothesis further postulates a relationship between the degree of repression and the degree of parasympathetic excitement which is direct, but of unknown ratio or proportionality.1

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¹ The hypothesis set up obviously makes no attempt to account for every factor within the horizon of the observant clinician or every accident of time and conjunction which could be conceived of. The currently popular concepts of the "total organism" and the "total situation", while useful as frames of clinical orientation, are empty and futile in the forging of a

THE EXPERIMENTAL PROBLEM

The problem at hand was to find a method of controlling the factor of repression in order to describe the behavior of other variables in the body's response to emotional stimuli in terms of this factor. The two variables chosen for this study were the gastric motility and the parotid gland secretory rate, since the behavior of these functions in relation to sympathetic or parasympathetic stimulation has been adequately studied and is well known. In general, wympathetic excitation tends to inhibit gastric motility; parasympathetic excitation stimulates motility. Sympathetic excitation tends to reduce the output of the parotid gland; parasympathetic excitation tends to stimulate secretion.

Метнор

The method used in this study is one calculated to afford a serviceable measure of control of both the emotional stimuli and the factor of repression. It was invented by Luria (15) for testing the responses to emotionally charged word-stimuli, and was extended by Huston, Shakow and Erickson (10) and Erickson (6) to provide a means of describing the symptomatic outlets of 'unconscious emotional complexes'. A similar method was used by Eisenbud (5) in the experimental production of a physical symptom, headache. The method consists essentially in inducing a deep state of hypnosis in a suitable subject, and then introducing an artificial "complex" by causing the subject to live through a trumped up emotional experience. When the subject finally is awakened from hypnosis with a command for complete posthypnotic amnesia, a factor tanta-

nosis with a command for complete posthypnotic amnesia, a factor tanta-selective experimental set-up outside of emphasizing the necessity of as much constancy as is practically possible among the factors not in the immediate field of operation or measurement.

mount to repression has been introduced since the situation causing the emotional experience which had been in consciousness during the hypnotic state is now quite beyond the range of conscious perception or recall.2 Although this method does not insure control of the subject's emotional state or degree of repression in any absolute sense, since the ultimate complexity of these factors still lies beyond the scope of objective description, the experimenter is nevertheless in control of the time at which grossly measurable changes in these factors are introduced. Thus regardless of the subject's past history, present psychological status, affective relationship to the experimenter, or any other variables which might color, distort or otherwise modify the effect of an emotional stimulus introduced at a given time, one important change in the total system is clear: a complex of perceptions, temporally and ideologically related to an emotional state, which during hypnosis is either partially or wholly in the subject's conscious mind is wholly out of the subject's conscious mind after amnesia has been produced. Thus even though a partial repression of this complex might tend to occur during the hypnotic state itself, the production of a total amnesia for the events of the hypnotic period represents the increment between an unknown degree of partial repression and the known limit of complete repression; and although we do not know the exact magnitude of this increment, we know the direction of change. It is the precise control of the temporal occurrence of this incre-

² The use of the word repression to describe this function is not without its disadvantages, since this term has a fringe of meanings which might peripherally grade off into non-applicability in relation to its present use. These disadvantages are outweighed, however, by the disadvantages entailed either in the manufacture of a new term or the puristic use of a precisely worded definitive sentence which would have to be hauled on to the scene every time reference had to be made to the function in question.

ment which is of importance in the description and measurement of any change in the functioning of the two selected variables.

Subject

The subject used in this study was an eighteen year old girl who was brought to the Psychiatric Institute and Hospital because of periodic, frequent, violently explosive tantrums of several years duration. After the usual clinical and laboratory study, the details and findings of which are not germaine to this paper, the diagnosis made was that of epileptoid personality. After several months of hospitalization the patient ceased having tantrums when she visited her home at week-ends, but developed instead a tendency toward cramp-like pains in the right upper abdominal quadrant whenever exposed to a situation which formerly might have provoked a tantrum. The lability with which this patient developed an apparent duodenal spasm, presumably in substitutive replacement of other, more direct means of emotional discharge, suggested that she would be a good subject for the present experiments on gastric motility. She was consequently trained as an hypnotic subject, during which training she adequately demonstrated her ability to develop a complete posthypnotic amnesia on command. After the first few trials, as a matter of fact, she would have a complete posthypnotic amnesia automatically and without the necessity of a specific suggestion to this effect.

APPARATUS

The method used to record gastric motility was the classical one involving a swallowed balloon which is then inflated to provide a column of air moving in response to the contractions of

the stomach. The only modification introduced into the present study was to use a membrane condom for the balloon proper, and to protect this membrane from the digestive action of the gastric juices by ensheathing it in an outer envelope of rubber, a rubber condom being most suitable (inset B., Fig. 1). The open end of the membrane condom is first tied securely to a two cm. metal tube which interrupts a Rehfuss tube about 12 cm. above the basket. The balloon is inflated and over it is slipped the rubber condom which is now tied at the same place after the air in the interspace has been milked out. The double walled balloon is then deflated and ready to be swallowed by the subject. After having been swallowed, the free end of the Rehfuss tube (Fig. I, n) is attached to the system shown in figure one and the balloon is inflated with 300 c.c. of air by means of the syringe (b) and three way stopcock (a). After the stopcock valve is shut, the air column moves in a closed system of communication between the balloon and the sensitive metal bellows (d) whose expansions and contractions are amplified and recorded by the writing lever (e). A water manometer (c) is inserted in parallel with this closed system. The kymograph is run at a speed of about two cm. per minute, and the timer (f) adjusted to record at 10 second intervals.

The measurement of the parotid gland secretory rate was accomplished with the aid of the Lashley suction disc (14) and a method of electrical recording essentially similar to that described by Finesinger and Finesinger (7). The suction disc (inset A, Fig. 1) is a cup of 18 mm. diameter with an inner chamber (a) which fits over the papilla of Stenson's duct, and an outer chamber (b) in which sufficient negative pressure can be created by simple oral suction on the attached rubber

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tubing was to keep the disc securely in place over the papilla. After the effective negative pressure has been created and the tube clamped off (Fig. 1, p, q) the disc will stay in place for hours. Before attaching the disc to the subject, the electrical recording system is made

free flow has been established, this end is finally attached to the three way stopcock whose valve is now turned to permit a continuous flow of saline between the collection chamber of the disc and the pipette. The tip of the pipette is graduated to emit drops of

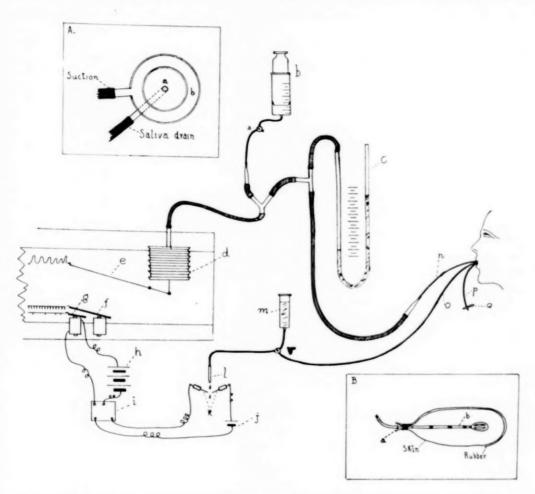


Fig. 1. Diagram of apparatus for recording gastric motility and parotid gland secretory rate. Inset A., Lashley suction disc. Inset B., Rehfuss tube with double walled gastric balloon.

ready by filling the pipette (I) and the connecting rubber tube between the pipette and the stopcock (r) with saturated salt solution from the reservoir (m). The suction disc and drain tube is next filled with saline and the disc then attached to the subject. After a few drops from the free end of the drain tube (o) have indicated that a

0.05 c.c. Each drop that falls makes a connection between the two electrodes (k) and completes the electrical circuit in which there is placed a six volt battery (j). A relay (i) with a $22\frac{1}{2}$ volt B battery in series (h) then magnetizes a 5 ohm coil which, attracting the lever of the ink writer (g), makes a corresponding graphic record of the drop.

GENERAL TECHNIQUE

The control and experimental sessions took place in a quiet room shielded from noisy interferences. Ordinarily the recording apparatus and the experimenter were in the same room as the subject, not completely out of her sight, but in several instances (see below) the subject was placed in another room where a thin wall separated her from the experimenter and the apparatus. This change of rooms did not manifest itself in control readings of the gastric motility. Controls on the parotid gland secretory rate were not done prior to the experimental sessions. The control and experimental sessions were begun between nine and ten A.M., with the subject on a fasting stomach. The readings were always taken while the subject was lying on a couch in the supine position.

Control readings on the subject's natural gastric periodicity, as determined on about 25 separate days, showed an initial contraction phase, after the balloon had been swallowed and inflated, with a mean duration of 19 minutes and a standard deviation of 5+ minutes followed by an atonic dilatation phase averaging 10 minutes with a standard deviation of 3 minutes. Following this, the stomach would begin again with small contractions and gradually work up to a five or six minute phase of almost spastic contractions before relaxing once again into the ensuing dilatation phase. This second contraction phase averaged about 33 minutes with a standard deviation of 5+ minutes. In each experimental session the complex was introduced after the stomach had completed the initial contraction phase, had passed through the atonic dilatation phase, and for some minutes had been on its way into the succeeding contraction phase—i.e., had been showing definite, small rhythmic contractions.

EXPERIMENTS TO DATE

Experiment 1: Gastric motility alone; experimenter and apparatus in room with subject.

Hypnosis begun at 9:23 A.M., in the middle of the initial contraction phase, and completed at 9:27. Dilatation phase set in at 9:38. After ten minutes of dilatation, small contractions with peaks about 25 seconds apart began to occur. After seven minutes of these small contractions the complex was introduced in the following fashion. The floor nurse came into the room breathlessly and in an excited sotto voce to the experimenter (but calculated to be easily overheard by the subject) explained that a certain patient, between whom and our subject there existed a mutual violent dislike, and who had sworn to "get even" with the subject before finally leaving the hospital, was leaving for good this morning. This patient, the nurse went on to explode, was outside our subject's bedroom, fighting to push past a few bystanders who were attempting to block her entrance and vowing that she'd get inside and wreck the place as a last spiteful gesture. Inside the room, and imminently in danger of destruction, were things upon which the subject had spent tender hours during the years of pursuit of her cherished hobbies-fine needle work, crocheting, carefully compiled scrap books, etc.,things known by all to be her proudest possessions. In the fracas there was a good deal of vituperative epithet flung at the subject by her enemy, and quoted by the nurse. Excited orders by the experimenter, also sotto voce, dispatched the nurse to call the supervisors and attendants to the rescue, and so forth. The entire scene between the experimenter and the nurse, previously well rehearsed, required less than one minute

As the complex was introduced (Fig. 2, first arrow) the gastric record shows an immediate inhibition of contractions and an apparent increase in the amplitude of the respiratory excursions which are superimposed on the gastric record. After $4\frac{1}{2}$ minutes of gastric inhibition, the subject was awakened from hypnosis with a complete posthypnotic amnesia for the events

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of the hypnotic period. With waking and amnesia (Fig. 2, second arrow) the contractions start up again, after which the stomach proceeds into its regular contraction phase.

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Experiment II: Gastric motility and parotid gland secretory rate. Subject in separate room from experimenter

eyes, although remaining in the hypnotic state, and to prepare herself to witness a movie. She was told to let her mind go free and to take in the full significance of what she was witnessing. Fifty seconds later the movie was begun. This was a six minute reel depicting an erotic, though not obscene, dramatic episode between a physician and a nurse, toward each of whom the

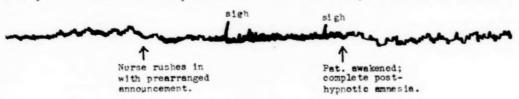


Fig. 2. Upper line is record of gastric contraction. Lower line is time marked in ten second intervals.

and apparatus. There is a hole in the wall above the head of her couch for the projection of a movie on the wall opposite.

Apparatus adjusted and record begun at 9:28 A.M. After 15 minutes of the initial contraction phase, the stomach went into its dilatation phase. Five minutes after the start of the dilatation phase, by which time the parotid gland secretory rate had

subject had markedly positive attachments. The movie was designed and filmed especially for the purpose of stirring up a mixture of emotions in the subject. Two and one-half minutes after the end of the movie, the patient was awakened from hypnosis with a complete posthypnotic amnesia.

In Fig. 3 it is seen that the stomach goes into an unnatural dilatation phase

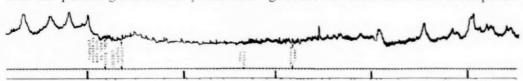
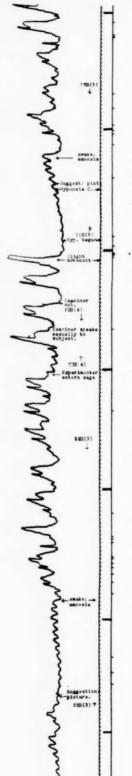


Fig. 3. Reading from top to bottom: Upper tracing=gastric contractions. Next line below=time in ten second intervals. Upright bars=swallow signals at five min. intervals. Lowest line=parotid gland secretory rate in drops.

settled down to a plateau of two drops during the preceding five minutes, hypnosis was induced. Seven minutes later small rhythmic gastric contractions began to appear which after 12 more minutes reached a fairly good size (peaks 60 seconds apart, duration of each about 35 seconds). At this point the complex was induced. The examiner told the subject to open her

as the subject is prepared for the movie; the parotid gland secretory rate, which had been proceeding at the rate of one drop during the preceding five minutes, starts up precipitately. As the picture is begun there is a temporary slight increase in the gastric tonus, the parotid gland secretory rate continuing



second intervals. Upright bars 4. Upper tracing = gastric contractions. Next line below = time in ten second intervals. Upri = swallow signals at five min, intervals. Lowest line = parotid gland secretory rate in drops. below = time

high. Between the time at which the picture ends and the waking from hypnosis with amnesia there is no great change in the gastric tonus, although one can make out what might be three or four small contractions somewhat obscured by the increased respiratory excursions. On waking from hypnosis with complete posthypnotic amnesia, the gastric contractions become more definite, the base line begins to slope upward, and there is a gradual progression into major contractions. The parotid gland secretory rate accelerates sharply after the amnesia, slows down after about five minutes, but continues to remain considerably higher than it had been before hypnosis was begun or before the picture was shown.

Experiment III: Following day. Gastric motility and parotid gland secretory rate. Subject on couch in projection room, experimenter and apparatus outside.

Apparatus adjusted and recordings begun at 10 A.M. Six minutes after the dilatation phase of the stomach had begun, by which time the parotid gland secretory rate had settled down to a rate of two drops during the preceding ten minutes, hypnosis was begun. Fifteen minutes later, as the parotid gland secretory rate was continuing the same and as the stomach was beginning to exhibit definite contractions, the complex (Fig. 4, first arrow) was introduced in the following fashion: the subject was told to resurrect in her memory the picture she had seen on the previous day (at first she said she could not recall it) and to let her mind play on it. Four minutes later (Fig. 4, second arrow) she was awakened from hypnosis with complete posthypnotic amnesia.

Fig. 4 shows that as the suggestion was given (first arrow) there is a temporary inhibition of gastric contractions followed by the starting up again of small contractions gradually becoming larger. The initial period of gastric inhi acce tory As the cele how patt mar glar min abo cha trac an foll crea tud

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inhibition is accompanied by a sudden acceleration of the parotid gland secretory rate (three drops in 70 seconds). As the gastric contractions increase, the parotid gland secretory rate decelerates. As the amnesia is produced, however, there is a sharp change in the pattern of gastric contractions and a marked acceleration of the parotid gland secretory rate which after three minutes again settles down to a rate of about one drop in five minutes. The change in the pattern of gastric contractions seems to be in two phases: an initial, short-lived inhibitory phase followed by a prolonged phase of increase in the duration and the amplitude of contractions.

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Fifteen minutes after waking the patient out of hypnosis with amnesia, hypnosis was again induced (see Fig. 4). A similar suggestion to recall the memory and significance of the movie was given to the subject $2\frac{1}{2}$ minutes later.

In Fig. 4 there is seen to be an inhibition of the gastric motility and an acceleration of the parotid gland secretory rate even before hypnosis was properly begun—at the point on the record marked "slight movement", which indicates that the subject was told to get set for hypnosis. The gastric contractions begin to increase in size, but once again at the amnesia there is seen to be a temporary initial inhibition followed by a complete change in pattern manifested by the increase in amplitude and duration of succeeding contractions. This is accompanied by an acceleration of the parotid gland secretory rate. The average for the parotid gland secretory rate for the 35 minute period following the amnesia, not shown in Fig. 4, was seven drops per five minutes.

Experiment IV: Following day. Gastric motility and parotid gland secre-

tory rate. Subject on couch in projection room, experimenter and apparatus outside.

Apparatus adjusted and record begun by 10 A.M. Hypnosis was induced about five minutes after the beginning of the gastric dilatation phase. Thirty minutes later, after the weak gastric contractions had given way to contractions of greater amplitude and duration, and the parotid gland secretory rate, which had been highly irregular, had settled down to what appeared to be its usual plateau, the introduction of a complex was attempted in a fashion similar to that in Experiment III. The suggestion was given to the subject that the scenes of the movie be recalled and pondered over. The subject, however, professed difficulty in recalling the movie. Seven minutes later, then, the subject was told to open her eyes, whereupon the movie itself was shown up to the point of the erotic climax (five minutes) when the reel was stopped and the subject awakened with an amnesia.

Fig. 5 shows no change in the gastric motility on giving the suggestion (first arrow) which could not have occurred under non-experimental conditions. There was no appreciable change in the parotid gland secretory rate. From the time that the picture was begun, however, and up to the waking and production of amnesia over five minutes later, there was an apparent inhibition of the gastric motility accompanied by an increase in the parotid gland secretory rate. At the production of amnesia there was an immediate increase of gastric tonus with two small contractions, and sixty seconds later a vigorous contraction which ushered in a contraction phase that proceeded uninterruptedly to its height before the next dilatation phase set in 33 minutes later. The acceleration of the parotid gland secretory rate following the amnesia is apparent in Fig. 5.

CONTROL EXPERIMENTS

A. Gastric Motility—controls done prior to the experimental sessions show

1) Simple induction of hypnosis does

poses because of the element of conditioning.

DISCUSSION OF RESULTS

A. Gastric Motility—The amplitude

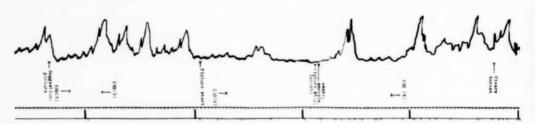


Fig. 5. Upper tracing = gastric contractions. Next line below = time in ten second intervals. Upright bars = swallow signals at five min. intervals. Lowest line = parotid gland secretory rate in drops.

not at any point of the gastric cycle affect the pattern of motility. (Compare Experiments I, II, III and IV.)

2) Waking the subject from hypnosis, at any point of the gastric cycle, with complete posthypnotic amnesia not following the introduction of a complex does not affect the pattern of motility. (Compare Experiments I, II, III and IV.)

3) Forced breathing does not inhibit contractions at any point of the gastric cycle. (Compare Experiments I and

4) Swallowing at five minute intervals does not affect the pattern of gastric motility.

5) Having the subject witness a neutral movie either during hypnosis or in the waking state does not affect the contractions at any point of the gastric cycle. (Compare Experiments II and IV.)

B. Parotid gland secretory rate: due to certain unfavorable circumstances, control readings on the parotid gland secretory rate in respect to the induction of hypnosis and the waking from hypnosis with amnesia were not done prior to the experimental sessions. Controls done after several such sessions would be invalid for comparison purof the gastric contractions seen in Fig. 2 is not strictly comparable to that of the contractions in Figs. 3, 4 and 5 because of a change in the arc of the re-

cording lever.

In Experiment II an inhibition of the gastric motility is seen to occur as the subject is prepared for the showing of the movie (Fig. 3), i.e., before the movie itself was begun. This effect is possibly related to the fact that in spite of all precautions, suspicions about a certain "mysterious" movie had leaked out. Thus, whereas the subject did not know at the start of the session that a movie would be shown, she must have been thrown into a certain uneasy expectancy when the fact that one would be shown was announced to her under hypnosis.

The relation between an amnesia for the content of an emotionally charged situation and a parasympathetic response as indicated by the stimulation of gastric motility can be seen in Experiments I, II, III and IV. The presumption that this change in the pattern of gastric motility is a parasympathetic or vagal effect is supported by the biphasic aspect of the change seen in both the instances shown in Fig. 4: an initial brief period of inhibition is follo in r tion prir gas of t exa tha ami

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h tl followed by a more prolonged increase in motility. It is known that stimulation of the vagus may have just such a primary, brief inhibitory effect on the gastric motility (4, p. 32). The absence of this biphasic reaction in the other examples is possibly due to the fact that at the time of the production of amnesia the motility of the stomach was still in a state of relatively deep inhibition and thus could not register further inhibition. The problem of why in two of the five instances the stomach did not remain in a state of inhibited motility throughout the duration of the complex-stimulus in hypnosis (i.e. up to the waking and amnesia) may have to do with the psychological nature of the stimulus, with the reactive cholinergic or 'contre-coup' effect of sympathetic excitement,3 or both. This 'escape' from inhibition can be plainly seen in the two instances shown in Fig. 4. To refer to this as the effect of 'intrahypnotic repression' would be begging the question as far as testing our hypothesis goes, even though we are fairly certain from general observation that such a process occurs. This problem, itself demanding investigation, lies outside the immediate scope of our thesis. It need simply be stated that the appearance of these effects in no way necessitates any immediate alteration of our working hypothesis.4

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³ Bender (2, 3) has demonstrated in cats and monkeys what he terms a "delayed or reactive acetylcholine effect" of the intravenous injection of large amounts of adrenalin where sixty to ninety seconds following such an injection a definite acetylcholine or parasympathetic effect was noted. The converse, a "reactive adrenalin effect", was observed following the intravenous injection of large doses of acetylcholine, but this took place in much shorter time. Such reactive or 'contre-coup' effects have been well established in other physiological patterns and play an important rôle in the homeostatic balance of the body.

⁴ It is quite probable that had the waking from hypnosis and the production of amnesia been delayed, the growing contractions seen in Fig. 4 and referred to as constituting an 'escape from inhibition' might have gone on to patterns of fully developed motility or even spasm. This had to be interrupted, however,

It should be made clear at this point that the working hypothesis offered does not place the factor of repression as necessarily the prime mover in the system of changes by which the human organism maintains its homeostatic balance in emotional situations, although in these experiments repression was the operated variable and as such the 'first cause'. But in vivo, so to speak, the relative orbit of repression in the integrated hierarchy of bodily functions still remains to be carefully plotted out in future work. If it can be well established, for example, that the function of repression is related to a parasympathetic or cholinergic response, the conditions of such a relationship might conceivably be found to be broader than those described in a simple 'one way' causal determinism such as might have operated in our experiments. Although the results of the present experiments on gastric motility would seem to indicate the reaction: repression-parasympathetic response, these results in no way rule out the possibility of the arrow being turned the other way in many actual human situations. It may be that under non-experimental conditions the psychologically perceived function of repression is itself in many, if not in all, instances a dependent effect of the liberation of acetylcholine either into the general circulation (1) or locally into certain cerebral areas—this, in turn, depending on a still more primary sympathetic excitement as the initial effect of an emotional stimulus. It must be remembered that the understanding not only of repression but of the entire phenomenological realm of

purely for the purpose of testing the hypothesis under just such a circumstance. In further work, naturally, different time intervals will have to be tried, as will also the introduction of the complex and the creation of amnesia with the stomach at points of tonicity, motility or inhibition other than those worked with in the present experiments. 'defense against anxiety' in normal and abnormal psychology still lacks an answer to the crucial question "Why the necessity of defense?". The answer to this, despite certain syndromes like neurasthenia where psychological reasons for the defense do seem to operate, cannot be sought in the fixed furniture of a purely psychological frame of reference, but must be sought in the more fundamental properties of the body. The phenomenon of the 'reactive (contre-coup) effect' in conjunction with the phenomenon of conditioning offers the best possibility of an approach to this question. We might speculate, thus, that a statement couched in psychological terms such as "Repression occurs because the anxiety associated with a certain complex is too much for the ego to tolerate" might be some day more precisely expressed as "Repression occurs as a consequence of the cholinergic 'contrecoup' effect which the emotional stimulation of the sympathetic branch of the autonomic nervous system generates." The only point to which this thesis limits itself, however, is that repression can be artificially induced, and that it appears to be temporally associated with certain evidences of parasympathetic excitement.

B. Parotid gland secretory rate The only measure of parotid gland secretory rate which could be achieved in this type of experiment would necessarily be of use only in comparing rates before the introduction of a complexstimulus, during the maintenance in hypnosis of such a stimulus, and after waking with amnesia. That such rates might be higher all around than corresponding rates measured in the same subject without an inflated balloon in her stomach and a tube in her mouth, pharynx and oesophagus is possible. Hisada (9) found in dogs that distention of the stomach elicited reflex secretory activity of the submaxillary gland which varied directly as the internal gastric pressure. Certainly the range of rates obtained in our subject far exceeds that found by Strongin and Hinsie (16) in "average-normal" subjects where they found an average secretion of .07 c.c. for five minutes, with a range from .02 to .15 c.c. In order to validate the measurement of the parotid gland secretory rate for the purpose of experiments such as those described in this study, controls would have to indicate either that the presence of an inflated gastric balloon and connecting tube was a constant stimulus the effect of which could be subtracted from the effects of other stimuli, or that the presence of such apparatus was a transient stimulus whose effect wore off by the time the other stimuli were introduced. The fact that in our records the parotid gland secretory rate started off abnormally high but then settled down to a plateau of about one drop (.05 c.c.) in five minutes would be presumptive evidence of the latter possibility.

Even in regard to a normal difference in rate between hypnosis and the waking state, moreover, we are confronted by the probability that this would necessitate careful control readings before our experimental records would have any significance. Jenness and Hackman (11) found that the salivary secretion during hypnosis was lower than that during the waking state. Beyond that, we know also that even the slight bodily movement involved in waking is enough to cause an acceleration of rate.

The last two of the above cited conditions would tend to render any statements about the significance of the acceleration of the parotid gland secretory rate after amnesia unworthy of consideration in the absence of adequate controls. The fact, however, that

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r v in three of the four instances in our experiments in which the parotid gland secretory rate was recorded before, during and after the complex followed by amnesia the rate remained considerably higher after amnesia than it had been before hypnosis is highly suggestive and would seem to be in harmony with the hypothesis advanced. The fact that in each instance there was an acceleration of the parotid gland secretory rate as the complex-stimulus was introduced under hypnosis would not necessarily run counter to the hypothesis advanced; it is simply outside its immediate scope, and would have to be evaluated in the light of investigations into the possibility of its being either the effect of sympathetic stimulation of the parotid gland (13, p. 285) or an effect of parasympathetic stimulation occurring either as a primary response to an emotional stimulus⁵ or as a secondary cholinergic response to the liberation of adrenalin into the general circulation.

SUMMARY

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The hypothesis to be tested was that the function of repression varies directly with the excitement of the parasympathetic branch of the autonomic nervous system. A method of testing this hypothesis, using the gastric motility and the parotid gland secretory rate as indices of autonomic nervous system function, is described. The results of the experiments with gastric motility are, as far as they go, in harmony with the hypothesis. The results of the simultaneous experiments with

the parotid gland secretory rate are highly suggestive but require careful controls before a more definite impression can be gained. The method described can be used in plotting out the behavior of other autonomic functions in relation to the function of repression.

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⁵ The hypothesis offered does not state that an unrepressed emotional stimulus may not be associated with a parasympathetic response; it states only that after an emotional stimulus the function of repression is associated with such a response.

CONDITIONING NEUROSES IN DOG AND CAT

SIMON DWORKIN, M.D., M.Sc.*

THE GENERAL CIRCUMSTANCES under which neurotic behavior can be induced in animals are, by now, well known (cf. Babkin (2)). The primary causative agents are: 1) undue strain upon the nervous system 2) constitutional susceptibility. In the latter regard Pavlov was able, even among his conditioned dogs, to identify 2 principal types-one characterized by a stable, the other by an unstable nervous system. It is in the unstable type, where the normal balance between excitatory and inhibitory processes is lacking, that neurotic derangements

are apt to occur.

We thus have, as prime causes of neuroses, an analogy to disease in general—the two factors of the seed and the soil. A third predisposing agency has recently been discovered by Petrova (8) namely, castration (in the male). This operation results in permanent weakening of the cortical-cell functions affecting, in particular, the inhibitory processes. Finally, a fourth etiological factor has been suggested by Anderson and Liddell (1) in suppression of neuromuscular activity. These workers find that trained sheep confronted with a problem, too complex to solve, show neurotic disturbances when the conditioning is carried out in accordance with the classical procedure, but not when the conditioning is done in a maze. The essential difference between the Pavlov and the maze technique, according to these observers, is that in the former spontaneous activity is suppressed through habituation; in the latter spontaneous activity is unrestrained. They point out that a difficult problem means increased nervous tension, and the end result will depend upon whether a means exists for lowering of this tension by performance of muscular movements. If the neuromuscular outlet is closed through previous training, it may eventually be forced open because of actual damage to the nervous system and give the neurotic picture in one or other of its forms. These findings open a new field of research on behavior, the rôle of free or spontaneous activity versus restricted activity in determining the character of reaction to nervous strain. wer sma did

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In the present paper are described observations that bear upon some aspects of the problem of etiology, and, to some degree, can be regarded as confirmation of the chief conclusions of Anderson and Liddell (1). For several years the writer has studied conditioned responses to various positive and negative signals by dogs and cats [Dworkin (4) (5)]. Among the stimulisituations used have been difficult tonediscriminations, and tests of hearing thresholds. Both agencies should be particularly suitable for creating nervous tension. Various nervous upsets did, in fact, occur in both species. What makes this account relevant to the discussion of etiology is the fact that all of the tests on dogs and cats were carried out in the same room and under very similar circumstances, with this exception: the dogs, following the Pavlov procedure, were trained to jump on to a platform and there held in place by the usual restraining harness; the cats

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were enclosed in a cage which, while small enough to prevent free wandering did not restrict ordinary body movements. The dimensions of this cage were 24 inches ×12 inches ×16 inches. Eventually behavioral disturbances supervened in most of the dogs used, but in only a few of the cats, and, what is noteworthy, the disturbances in the dogs were major, and long-lasting, while in the cats they were comparatively simple.¹

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The experiments with dogs and cats were carried out under conditions quite as rigid as those specified by Pavlov. The subjects were enclosed in a soundproof chamber, thoroughly isolated extraneous stimuli-whether coming from the observer himself, or from outside of the laboratory. The general bodily movements of the animals could at all times be observed through a camera obscura, set in a stone partition 28 inches thick, between the animals' and the observer's compartments. As unconditioned responses in both subjects one used the lid-lifting reaction of the motor-alimentary response previously described by the writer [Dworkin (4, 5)]. While this reaction is not, of course, a simple reflex, nevertheless with sufficient training it becomes as strong and as constant as salivary flow. The occurrence of the stimuli, as well as the lifting of the lid, were recorded graphically.

I. Experiments on Limits of Pitch Discrimination

The writer found previously that the ultimate limit of pitch discrimination

¹ In my experience, even in the normal animal, interruptions of the smooth and even behavior of conditioning are not rare. These disturbances are always short-lived. Apart from the duration, it is at times difficult to draw a sharp distinction between such upsets and what may be border-line neurosis.

in two dogs was between $\frac{1}{3}$ and $\frac{1}{4}$ of a tone [Dworkin (5)]. Attempts to carry the discrimination still further in both dogs resulted in complete inhibition.

These animals were given a rest of 2 months, and then brought back to the conditioning room. A new discrimination was established in each dog, namely bell from buzzer. This proceeded satisfactorily, being complete in 22 and 31 trials respectively. Then, tests were resumed on pitch discriminations, in which the frequencies were of the same order as in the first tests (2500 and 3000 cycles) but the loudness was reduced to 20 decibels above threshold. In the course of these experiments both dogs developed profound disturbances.

Even before the previous limits of discrimination were reached, certain changes of the ordinarily smooth and even behavior set in. First, the latent periods of the positive responses became prolonged, and the dogs would not take all of the food. This meant that the inhibition of the negative stimuli had spread to the unconditioned phase of the positive responses. The shorter duration of the positive response is shown in Fig. 1, B. The animals at this time began to lose their accustomed eagerness to enter the conditioning room, nor did they jump as readily as hitherto on to the training platform. When, on successive days the tones to be discriminated were brought even closer together, these changes became more pronounced. Although they continued to respond occasionally to the hitherto positive stimuli, the dogs ate less and less of the food. Then they had to be lifted on to the platform, and shivered and salivated profusely when the light harness was applied. Eventually all responses—whether to positive or to negative stimuli-were abolished (see Fig. 1, C). When one of the accustomed positive stimuli (pure tones, bell or buzzer, light, tactile stimulation) was presented, the dogs shivered violently, stamped their fore-limbs alternately and displayed other signs of restlessness. At times the animals would whine or bark loudly, and, like Pavlov's neurotic dogs, make vigorous efforts to get out of the harness. Sometimes these efforts were par-

was not much different from normal. In this state the training was discontinued, and several attempts made to resume it after varying periods of rest. The attempts were all unsuccessful, and ultimately both dogs were treated with several "disinhibiting" drugs [Dworkin, Bourne and Raginsky (6)].

Under similar conditions of stress, the cats offered an interesting con-

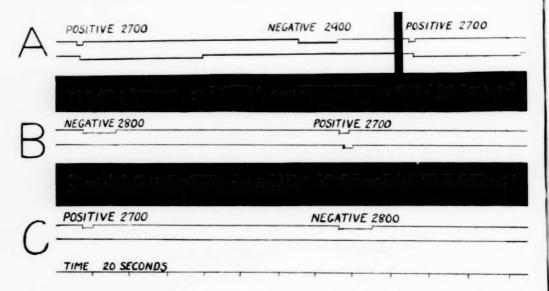


Fig. 1. Stages in development of neurosis in one dog during tests of pitch discrimination. The upper line in each record represents the occurrence of the stimuli; the lower, the lid-lifting responses. In A are seen the expected (normal) responses to 2 positive and 1 negative stimuli. The total duration of each of the positive responses (conditioned plus unconditioned phases) is more than 45 seconds. In B the total duration of the positive response is reduced to 6 seconds by the inhibitory after-effect of the preceding negative stimuli. The latent period of the conditioned phase is, in this instance, not impaired. In C is shown the complete failure of the lid-lifting response.

tially successful and resulted in the animal's being left suspended by one or more feet from the fixed cross bar.

In one of the dogs there occurred now and then a marked flexion of the left fore-limb which was maintained during the whole time that the animal was kept in the harness. Alterations of depth and rate of respiration were also noticed. Neither animal would, in the training room, take food even after several days' starvation. Outside of the room, however, and in their usual surroundings, the behavior of both dogs trast. In this species the delicacy of pitch discrimination is not nearly so sharp as in the dog [Dworkin (4)]. Attempts to push this cruder discrimination to its limit led quickly to disinhibition—i.e., to abolition of the 'restraint' to the negative stimuli. Thereafter the animals usually responded promptly to all stimuli whether positive or negative. The disinhibition is illustrated in Fig. 2. As an exception, one cat frequently became inhibited during the discrimination tests, and failed to open the lid to

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both negative and subsequent positive signals. This inhibition could be easily broken, either by reinforcing the positive stimuli sooner than usual, or by discontinuing the tests for a few hours. The interest in the food was never lost; nor in fact was there any outward sign of nervous stress—except perhaps for a certain air of exaggerated 'apprehension'. This was manifested by sudden lungings forward of the head as soon as the negative stimulus was

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dog and cat is being published elsewhere. The manner of presentation of the pure-tone stimuli was in accordance with the accepted routine of determination of thresholds. No preliminary warning signals were given. The time intervals between successive trials varied from 2 to 5 minutes. These experiments turned out to be well designed to subject the animals to a maximal degree of nervous strain.

During the first few months of the

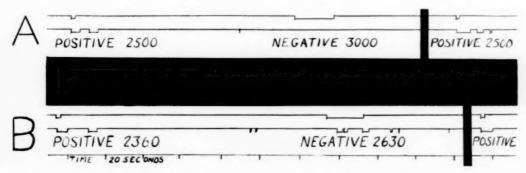


Fig. 2. Stages in development of simple disinhibition in one cat during tests of pitch discrimination. A shows normal responses to 2 positive and 1 negative stimuli. In the cat the total duration of the response is usually much less than in the dog, because the cat removes its food quickly from the rotary feeder and drops the lid. Note also absence of lid-lifting in the intervals between stimuli. In B is shown the break-down of the restraint during the sounding of the negative stimulus. Here the tones to be differentiated are closer than in the preceding records.

turned on, which were checked sometimes just before or just after the lid was touched. To continue with the experiments, the stimuli were separated by a greater frequency interval, when differentiating inhibition was again established. Even after weeks of repetition of this mode of experimentation, true neurotic upsets were never induced in the cats.

II. Effects of Stimuli of Threshold Intensity

In the experiments on hearing acuity the subjects were confronted with sounds of varying pitch, the loudness of which was gradually reduced to the actual threshold, or even below this. A description of the hearing acuity of testing when the loudness of the pure tones was always 20 decibels or more above threshold, the behavior of both species remained regular and even. In these earlier tests, 2 to 3 rather loud and different sound signals were alternated with the musical tones. When, in later experiments, the actual thresholds were explored, it was customary to use only one or two loud tones at the beginning of each training session, then one proceeded to reduce the loudness in succeeding tests to below the threshold. It was in the course of these later tests that marked changes in behavior occurred, and these were altogether different in the two species.

Four out of seven dogs used in this research underwent a gradual change of behavior which rendered them unfit, within 4 to 6 months, for further work on the problem in hand.

These subjects, confronted repeatedly with stimuli of 10 to 5 decibels above threshold, at first responded after a prolonged latent period of 4 to 20 seconds instead of the usual 1 to 2 seconds. When, following this response, the food was presented, they ate only a part of the usual amount; here, too, the inhibition had irradiated to the unconditioned phase of the response. Later in the course of this testing the animals made only brief, hesitant attempts to open the lid, and refused to take any food at all when the pure-tone stimuli were reinforced.

In two of these animals a complete and permanent inhibition supervened. At first the inhibition was associated only with the very weak pure-tone stimuli; then it spread to involve the louder musical tones, and finally affected all other forms of stimulationwhether light, bell, buzzer, or tactile. Like the two neurotic dogs described earlier, these animals rejected all food within the conditioning room but ate well enough in their more customary quarters. In contrast to the other animals, however, they showed few general bodily or temperamental changes. They remained quite still in their harness, with head held fixedly in front of the loud-speaker. Even the general orienting reaction—a prominent feature in the normal dog—was abolished. While occasional slight head-movements, or even stretching movements of a limb, showed they were not asleep, these dogs could not be aroused by the usual stimuli. These subjects were given a rest of I and 3 months respectively, and again tested. Some of the positive stimuli regained effectiveness, but no responses could be elicited by the pure-tones.

Two other dogs were similarly inhibited by continual presentations of

very weak tone-stimuli. In one of these the inhibition sometimes extended to the other stimuli. In the other animal the inhibition was confined to the puretones. In both, the characteristic attitude and fixed position of the head with reference to the sound-field was again observed. While the conditioned responses to the bell, buzzer, light, and tactile signals often occurred promptly as usual, the unconditioned phase was always reduced. This meant, of course, the taking of less food, and, with the usual small supplementary feeding, a gradual loss of weight. It was, therefore, necessary to increase the supplementary rations provided in the animals' quarters. Both of these animals appeared, generally, as eager and playful as ever, yet could not be induced to respond to the previously effective pure-tones.

In the far larger number of cat subjects tested, three types of reactions

could be made out:

a) The even reaction: Only 9 animals out of 34 went through the whole training procedure—leading to the establishing of audiograms—without showing definite behavioral changes. These animals could be trained day after day to stimuli which began at about 25 decibels above threshold and were attenuated progressively. With the further attenuation, the latent period of the responses became longer; occasionally there would be several discrete false responses, but nothing else that would indicate a serious disturbance of behavior (see Fig. 3 A₃).

b) Inhibitory disturbance: Four other cats showed a different type of reaction under strain. As the stimuli were gradually reduced in loudness to 10 db. above threshold, the latent periods remained quite constant; but suddenly, when a still weaker tone (5 db. to 0 db.) was presented, the response failed. Thereafter the pure tone stimu-

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lus was considerably strengthened. The result was rarely a prompt response; more often the inhibition continued and spread, not merely to the other pure tones but to all other stimuli (bell, buzzer, or light). In two of these subjects the inhibition spread also to the unconditioned phase—as in the inhibited dogs—and these cats then refused to take their food. Obviously these cats had developed a rather powerful "inhibition" of the lid-lifting

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ments, and in all sorts of attempts to escape from the training cage. But the chief characteristic of these disturbances was their very short duration; for the responses were always restored to normal after a few hours' rest.

c) Disinhibitory disturbance: In the majority of cat subjects the effect of repeated exposure to threshold stimuli was outbursts of false responses. Such responses have been noted by Wendt (9) in monkeys and by Culler (3) in

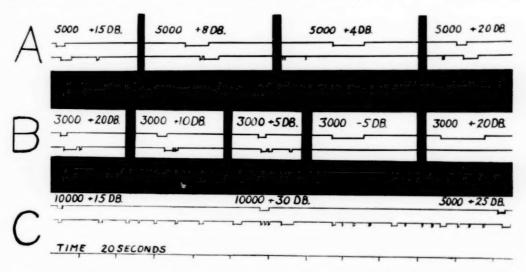


Fig. 3. Records from 3 different cats, to illustrate different reactions to stimuli of threshold strength. A shows the 'even' type of reaction. With attenuation of the stimulus the latent period is lengthened, until the response cases. A subsequent loud tone-stimulus then evokes a good response. B demonstrates in another subject the lasting inhibitory effect of a threshold stimulus. In this case a subsequent loud stimulus is ineffective. C shows the occurrence of interval responses, in a third subject, after more or less prolonged exposure to faint tone-stimuli.

response. The inhibitory influence of a stimulus of threshold strength is shown in Fig. 3, B.

Accompanying the inhibition one always observed a remarkable amount of general bodily movement. In one cat this took the form of furious scratching of the floor of the cage, which resulted occasionally in breaking off of a claw-nail. In a second cat, rolling movements of the body were a common feature. Apart from these special activities the cats indulged frequently in washing, in circling move-

dogs, also during tests of hearing thresholds. In the cats the outbursts came on suddenly, as a rule when the stimuli were reduced to within 10 decibels of the thresholds. The amount as well as the duration of these disturbances varied. When this interval activity was great it became impossible to correlate any of the responses with the known presented stimuli. Fig. 3, C, illustrates the extent of this interval activity in 4 minutes. This made it necessary to discontinue the tests.

In some cases the furious lid-lifting

activity was interrupted while the animal rolled itself repeatedly on the floor of the cage. When this type of hyperactivity occurred, it made the animal refractory to the succeeding positive stimuli.

It was often easy to check this interval activity by exhibiting a strong stimulus (bell or buzzer); but it recurred when several weak stimuli were again presented.

The state induced in these animals was quite comparable to that seen in early training, which is characterized by the gradual disappearance of excessive activity. The occurrence of such activity—at a time when the animal should be quiet—bespeaks a collapse of the inhibition developed in early training and maintained strongly hitherto. Essentially this collapse, or disinhibition is comparable to that shown by the cats whose inhibitory processes were overstrained in the tests of pitch discrimination.

By way of treatment, a short rest was sufficient, as a rule, to restore the normal inhibition between stimuli, but interval activity was resumed as soon as several weak tones were again employed. At its worst in 3 cats this disinhibition lasted 3 weeks, and could then be called, perhaps, a 'disinhibition neurosis'. Even this condition was overcome by first discontinuing the tests as soon as the activity began, then training the cats every two days to a series of stronger bell, buzzer and tone stimuli. Nothing comparable to the long-lasting excitatory or inhibitory neurosis of the dog was ever seen in the cat subjects.

Discussion

In the above described experiments, several different types of behavior disturbances were met, under conditions of stress. When limits of pitch discrimination were being explored, two dogs developed a mixed (excitatory and inhibitory) neurosis, not unlike the classical instance of Pavlov's animal which was being trained to discriminate between a circle and an oval. The cats, however, solved the discrimination problem rather easily by responding positively to both positive and negative signals. This can be regarded, in Pavlov's phraseology, as a simple and straightforward disinhibition.

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When confronted with threshold stimuli, four dogs underwent a permanent inhibitory disturbance. Certain aspects of this disturbance—the still posture and absence of orienting reaction while the dog was not asleepindicated a different neurosis from any described hitherto. To some extent this condition resembles a state described by Pavlov (7) in one dog which had been conditioned to a faint auditory stimulus. The source of the sound was beneath the table on which the dog stood and to the right. When this stimulus was turned on the animal took a position at the end of the table and kept his head lowered to get closer to the sound. There were also other stimuli which were much stronger and came from different sources, but at the moment even of their occurrence the dog still persisted in orienting toward the source of the faint sound. Now the faint sound was discontinued as a stimulus, while the other stimuli were presented from time to time in successive experiments. Nevertheless the dog persisted in the above-described orienting reaction, as part of the response to all the stimuli. This pathological reaction Pavlov regarded as different from the usual dog neurosis and quite comparable to human paranoia or obsessional neurosis. The initiating cause of this flight from reality was to be sought in "hypertension of the processes of excitation which provoked an extreme tension of the entire motor apparatus of orientation".

In Culler's experiments in which dogs were subjected to threshold stimuli (3) overactivity was a prominent feature, although underactivity was also noted under some conditions. Two possible reasons for the different response-pattern suggest themselves. One is the different unconditioned stimulus which in Culler's dogs was the compelling electric-shock, rather than presentation of food. The other is the very short intervals between successive tests which were spaced from 15 to 45 seconds. In the writer's tests, intervals varied from 2 to 5 minutes, as stated

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Among a relatively large number of cats exposed to stimuli of threshold intensity, 3 types of responses were noted. A few animals showed an even, scarcely interrupted behavior, with only occasional interval activity (false responses). In 4 other cats, there occurred a total failure of the specific response, nearly always accompanied by a great increase of the general bodily activity. In this more complicated picture, one might suppose a marked dominance and extension of the general excitatory functions, which, conceivably left the animal refractory to the relatively minor action of opening the food lid. In all of the other animals the ultimate effect of the weak stimuli was to cause a complete disinhibition. Here the hypertension of the excitatory processes had overcome the fundamental interval inhibition.

From the above experiments it is clear that, subjected to precisely the same degree of nervous strain, the cats reacted very differently from the dogs. While both animals did develop disturbances, these tended toward inhibition in the dogs, but excitation in the cats. Apart from this, the outstanding differences were in respect to the depth and the duration of the upsets. In turn, all of these differences seem to be a reflection of the general neuromuscular activity exhibited by each species. The quiet, restrained dog suffered real damage; the freely moving cat, a comparatively trivial derangement. These observations seem to substantiate what I take to be the main thesis of Anderson and Liddell(1)—concerning relationship between neuromuscular activity and development of neurosis during conditions of strain. Whether, in the dogs used in the present research, the restraint was an inherent characteristic, or whether it was imposed by habituation to the harness, can be settled only by direct experiments. In the latter regard, some observations by Wendt (10) are of interest. This investigator studied inhibition of a food taking reaction in monkeys. In some respects the training conditions were similar to those of the cats, as described here. Thus, Wendt's subjects also were trained in a cage which afforded freedom of bodily movement. During inhibition the monkeys occupied themselves with new activities, such as substitutive actions at the food grille. Inhibition of the special food-taking response was accompanied by increased general activity, which the author interprets as a redirection of the inhibited activity into other response systems. In a second series of experiments, merely restricting the movements and forcibly immobilizing the head of monkeys and of dogs, induced a general inhibited state, resembling a partial hypnosis. Even responses to positive stimuli were inhibited. The greatly different behavior was caused by the restraint of general movements, imposed from the outside.

In favor of an internal, or species background for the different reactions of dog and cat is first of all the different structure of the cortex cerebri, which might well denote fundamentally different nervous systems. Then, as the writer has shown, capacity for differentiating inhibition—at least that concerned with the acoustic analyzer—is better developed in the dog. Whatever turns out to be the real basis for the very different responses to nervous strain, there seems every reason to agree with Anderson and Liddell that, in the cat as in the maze running sheep, "freedom of locomotion enables the animal to run away from a problem rather than to solve it".

SUMMARY

Under identical conditions—except as to freedom of locomotion—dogs and cats were subjected to stimuli situations in which the nervous system was placed under undue strain. The situations involved delicate discriminations of pitch, and perception of sounds of liminal intensity. The harnessed dogs developed serious neurotic disturbances, mostly of an inhibitory nature. The freely moving cats also developed behavior disturbances, mostly of an excitatory nature, which were quite impermanent. While the difference of reaction may have been due either to

different nervous systems, or to the mode of training, it seems logical to conclude that it was the opportunity for occurrence of gross bodily movements that determined the character of the neurotic disturbance. PSYC

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AUTONOMIC INTEGRATION IN SCHIZOPHRENIA

AUTONOMIC STATUS DETERMINED STATISTICALLY, THE THYROID FACTOR, AND A POSSIBLE THYROID-HYPOTHALAMUS MECHANISM

Joseph C. Rheingold, M.D.*

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THE STUDIES IN THIS SERIES deal with problems of autonomic function in schizophrenia. The aim is ultimately to formulate the characteristic defect or defects of homeostasis.

As a basis for an experimental approach it is necessary first to define the vegetative pathoplasia of the disease. The contributions of the Memorial Foundation for Neuro-Endocrine Research do not serve the present purpose because its findings are derived mainly from study of long-hospitalized male patients and the need here is the description of an unselected schizophrenic population in early stages of the psychosis. There seems, indeed, to be no report in the literature on objective findings in a group of incipient cases large enough to assure the validity of a statistical analysis (30).

To determine the vegetative characters of schizophrenia, first a survey was made of the organic data in the records of 129 schizophrenic subjects. The results are reported in this paper together with an attempt to appraise the influence of the thyroid gland in the production of the schizophrenic syndrome. Then a single patient was studied over a period of a year by the daily administration of a battery of tests. These results will be presented in a subsequent paper.

PROCEDURE AND RESULTS

Since schizophrenia presumably is not a disease entity, a reasonable degree of homogeneity of a schizophrenic group must be demonstrated before its statistical analysis may be profitably undertaken. The criteria of reasonable homogeneity are probably satisfied when the cases are classified by a uniform practice, one body type preponderates, the age range is not too great, the subjects are in about the same stage of the disease, the extremes of psychomotor activity are eliminated, and each sex and each clinical subgroup is analyzed separately.

The patients in the present group were admitted to the Psychiatric Institute between the years 1931 and 1936. The classification in each instance was made by Dr. H. Douglas Singer and was confirmed by the State hospitals to which some of the patients were later transferred. Of the 129 patients, 43.4 per cent were males and 56.6 per cent, females. The sex distribution in the several clinical subgroups is shown in Table II. The charts show histograms of age, weight, pulse rate, blood pressure, oxygen consumption rate, and blood chemical findings in 129 cases of schizophrenia-ordinates represent frequency; solid line, males; broken line, females. The histogram of age shows that the subjects bulk in the third decade of life. The paranoid group is

^{*} From the Psychiatric Institute (Dr. H. Douglas Singer, Director) of the University of Illinois College of Medicine.

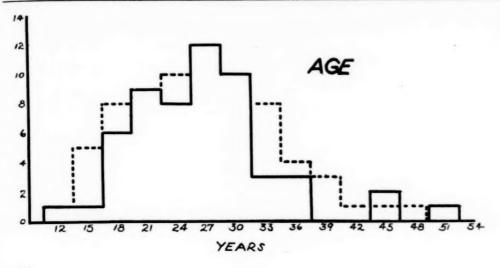
TABLE I ORGANIC FINDINGS IN 129 CASES OF SCHIZOPHRENIA TABULATED FOR EACH SEX AND TOTAL GROUP

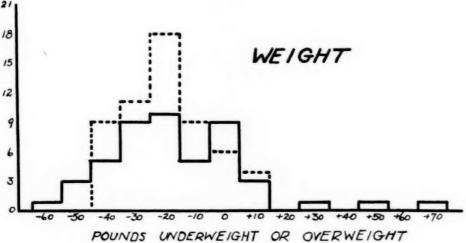
	Males	Females	Total Group	
Weight—				
Mean	140.7	107.5	124.1	
% Cases under	69.0	81.0	75.0	
Means lbs. under	22.5	22.5	22.5	
% of prediction	13.8	16.4	15.1	
% of prediction % Cases normal % Cases over	17.0	5.0	11.0	
% Cases over	14.0	14.0	14.0	
Mean lbs. over	38.9	15.5	26.4	
Pulse Rate—	76	82	79	
Blood Pressure—		_	12	
Systolic	115	105	110	
Diastolic	76	72	74	
Pulse Pressure	39	33	36	
Oxygen Consumption—	33	33	300	
Mean minimal rate	-15.7	-16.7	-16.2	
% Cases below - 10	53.0	69.0	61.0	
Mean	-22.5	-21.2	-21.8	
% Cases - 10 to +10	47.0	29.0	38.0	
Mean	- 2.1	0	- 1.05	
% Cases above +10	0	1.56	0.78	
Mean		+11	+11	
Blood Chemistry—			1.4	
N. P. N.	29.7	30.3	30.0	
Dextrose	91.7	89.7	90.7	
Cholesterol	194.9	218.8	206.8	
Carbon-Dioxide C.P.	56.4	53.9	55.1	
Blood Cytology—	3-14	23.7	81.8=	
Hemoglobin %	86.8	77-4	13.08 Gm	
R. B. C. (millions)	4.86	4.37	4.62	
Color Index	0.89	0.87	0.88	
W. B. C.	8,010.	7,840.	7,920.	
% Neutrophils	61.2	59.9	60.4	

distinguished by a mean age which is II). Photographs of the patients in the about eight years greater than the nude suggest a preponderance of the mean ages of the other groups (Table leptosomic habitus. The mean duration

TABLE II ORGANIC FINDINGS IN 129 CASES OF SCHIZOPHRENIA TABULATED FOR EACH CLINICAL SUB-GROUP

	Simple	Hębephrenic	Catatonic	Paranoid	Other Types
No. of Males	11	33	q	8	5
Mean Age	24.6	25.7	27.7	35-4	26.8
No. of Females	7	19	8 .	22	17
Mean Age	27.0	25.4	25.0	31.7	26.1
Weight, % cases under	78	89	7.3	54	78
Weight, mean lbs. under	25.3	22.5	22.4	22.5	19.8
Pulse Rate	77	78	79	78	8,3
Systolic B. P.	114	106	107	114	109
Diastolic B. P.	78	71	72	7.3	74
Pulse Pressure	36		* 35		35
B. M. R., % cases below - 10	57	35 65	60	65	64
B. M. R., Mean	20.2	27.4	16.0	19.9	25.7
Cholesterol	196.4	200.3	221.7	227.5	185.9
N. P. N.	27.2	30.5	30.1	30.4	31.2
Dextrose	88.0	91.3	87.5	94.2	92.4
Carbon-Dioxide C.P.	54.2	57.0	55.1	56.3	
Hemoglobin %	79	81	84	83	53.2 82
R. B. C. (millions)	4.65	4.55	4.69	4.68	4.56
Color Index	0.85	0.89	0.89	0.88	0.89
W. B. C.	6,940.	7,550.	8,250.	7,440.	9,430.
% Neutrophils	57.7	60.4	61.2	57.6	65.3

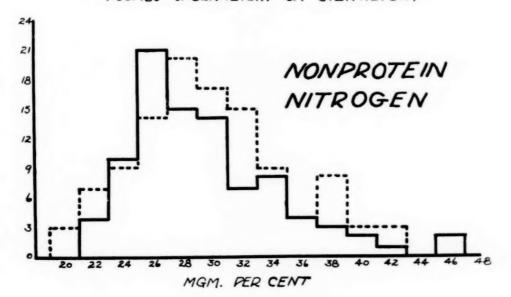


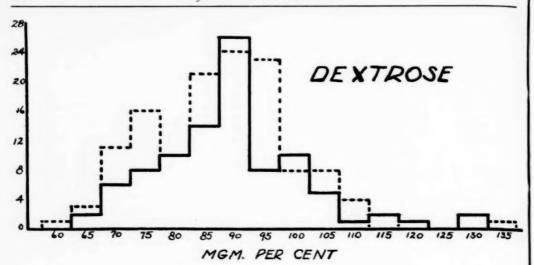


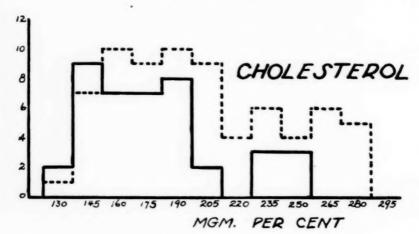
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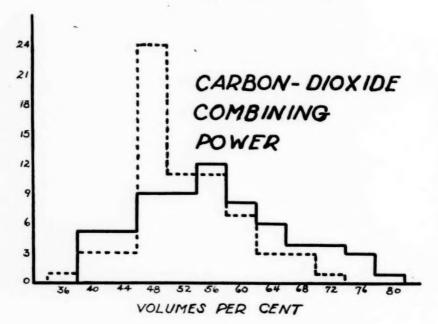
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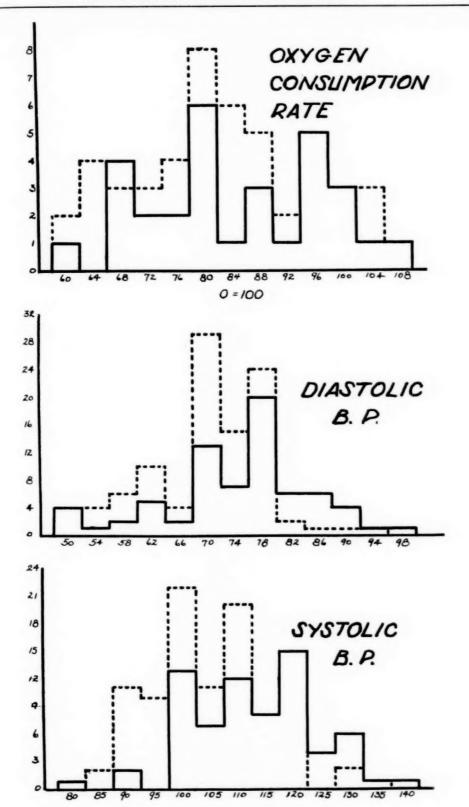
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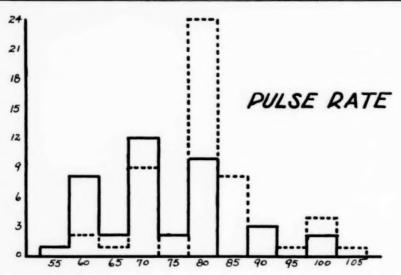












of the psychosis prior to admission was about five months and, in more than half of the cases, less than one month. Clinical and laboratory examinations were made within the two weeks following admission. Psychomotor activity is a random error in a large series of cases but in any event the more stuporous and more excited patients tend to exclude themselves because of non-cooperation. This exclusion, apart from geographic selection, is the only selection factor. Patients with complicating physical illness affecting metabolic status were not included in the study.

One may therefore venture to say that the findings for each sex, as shown in Table I, characterize a homogeneous schizophrenic population. That sex is a significant variable is demonstrated by the consistently greater tendency of the females to hypometabolism. In the case of the sub-groups (Table II) the numbers of subjects in each classification, certainly in each sex-sub-group class, are too few to warrant statistical analysis. It will be observed, however, that despite differences at the clinical level, the sub-groups yield very similar metabolic pictures.

The data reported on comprise weight, pulse rate, blood pressure, basal

metabolic (oxygen consumption) rate. blood chemistry, and blood cytology. Body temperature and respiratory rate were excluded because they were not determined under standard conditions. Urinalysis was qualitative only. Cerebrospinal fluid findings were in general normal. Insurance statistics served as standards of weight. The rate of oxygen consumption was measured by the Benedict-Roth metabolimeter using the Boothby-Sandiford modification of the Du Bois standards. In 53 per cent of the cases two to fourteen readings were made. In these instances, the minimal rate, rather than the average of the several readings was taken as the more reliable index of basal metabolism. The blood content of nonprotein nitrogen was determined by the modified Koch-McMeekin Method; dex-Benedict by the modified trose, Method; cholesterol of the whole blood, by the modified Bloor Method; and carbon-dioxide combining power of the plasma, by the Van Slyke and Cullen Method. Hemoglobin was measured by the Dare instrument and blood counts were made in the usual way. This battery of tests was not always administered on the same day but never over a period of more than a week.

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There was of course no planned control study but what may be used for this purpose are the ranges of variation (29) for blood chemical and cytological determinations made in thousands of subjects in the clinical laboratories of the Illinois Research and Educational Hospital of which the Psychiatric Institute is a part. Unless the control subjects match the schizophrenic patients in at least the sex ratio, age range, and incidence of leptosomes there is probably little point in setting up a special control group.

In the statistical analysis of the data the mean is used as the expression of central tendency (Tables I and II) and the histogram as the expression of

variability (see Charts).

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Weight: Three-fourths of the patients are about 15 per cent below standard weight. Hoskins (21) found the mean weight of 57 male schizophrenics 16 per cent below prediction. Since this degree of underweight may be characteristic of the leptosome, one need not conclude that a higher incidence of malnutrition exists in the schizophrenic group than in a normal group. Nor does low mean weight mirror chronicity since the incidence of underweight men (69 per cent) in this series is greater than that of patients in Hoskins' series (55 per cent) who were hospitalized a mean of 5.9 years.

Pulse Rate: Mean values are within a normal range but group variability is probably greater than normal. Hoskins and Sleeper (20) found an average pulse rate of 59.2 in 57 schizophrenic men. The discrepancy may possibly be accounted for by the practice at the Worcester State Hospital of determining pulse rate, as well as blood pressure,

under basal conditions.

Blood Pressure: The mean systolic and diastolic levels are lower than those of the general population (127.6/83.5 in 150,000 life insurance applicants). The

systolic pressure is reduced relatively more than the diastolic, producing a diminished pulse pressure. From Kraepelin on, almost all investigators have agreed that schizophrenia is characterized by a lowering of the blood pressure. The literature was reviewed in 1932 by Freeman, Hoskins, and Sleeper (9), who also reported a mean blood pressure of 104.5/54.5 in 180 male schizophrenics. The 323 control subjects likewise vielded low mean readings (115.7/71.2). The difference in systolic levels between patients and normal subjects (11.2) is about the same as the difference between the male patients in the present series and the general population (12.6). The lower readings at Worcester may be due to the more nearly basal conditions of testing.

Oxygen Consumption: Low metabolic rates are frequent in patients of the Psychiatric Institute. Readings in the range of minus 40 to minus 30 are not uncommon amongst the schizophrenic subjects. In the present group 61 per cent of the patients have a mean rate of minus 21.8 per cent and only two patients have rates (single determinations) above the conventional upper limit of plus 10. This result is in conformity with almost all other reports of basal metabolism in schizophrenia. The literature was summarized by Hoskins (17) who later reported a mean minimal rate of minus 18.9 per cent in his own series of 214 male schizophrenics (19).

An interesting finding is the lowering of the basal metabolic rate following exercise in 11 of 30 cases included in the present series. The basal rates and the rates after exercise were not determined on the same day but the difference between the two is too great to be accounted for by lower basal levels on the days of the experiment with exercise. Thus patient H.B. had rates of

minus 17, minus 6, and minus 4 under basal conditions on three successive days, but on the fourth, after stepping on and off a chair for one minute, had a rate of minus 34.

Nonprotein Nitrogen: The mean results are within a normal range and the curve of distribution approaches a normal frequency curve. Worcester (20), too, finds a normal N.P.N. level.

Dextrose: Mean values are again normal. The literature was reviewed by W. Freeman (11) in 1933. He reports a mean of 96.6 mgm. per cent for 347 determinations in 59 patients and a mean of 95.4 in 31 control subjects.

Cholesterol: Looney and Childs (31) in 1933 collected the literature on blood cholesterol determinations in both normal and schizophrenic persons. With the exception of two reports, normal subjects do not yield mean values above 200 mgm. per cent, no matter what method is used. The result of 206.8 in our schizophrenic group may therefore indicate a trend to high normal or slightly elevated blood cholesterol content. Five authors have reported mean values over 200 in schizophrenia but three have reported mean values between 140 and 200, and seven, below 140. Looney and Childs found a mean level of 158 in 50 schizophrenic men and that of 175 in 26 normal men.

Carbon-Dioxide Combining Power: The means falls at the lower limit of the normal range. Variability is pronounced with a preponderance of female cases in the 46 to 50 class interval. Worcester measures carbon-dioxide content, not combining power. Looney and Freeman (33) recently reported a venous content of 57.8 per cent in both 112 male patients and 67 control subjects.

Blood Cytology: (The histograms are reserved for a future paper dealing with the blood morphology in schizo-

phrenia.) The blood picture is characterized by mild secondary anemia, normal absolute leucocyte count, and low normal percentage of neutrophils. Worcester (4) reports the following findings in 57 men: R.B.C., 4,957,000; Hb, 15.3 gm.; W.B.C., 10,477; and neutrophils, 59.6 per cent.

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Discussion

Summarizing the foregoing results one may say that this group of schizophrenic patients shows trends to substandard weight; reduced oxygen consumption; normal pulse rate; lowered systolic, diastolic, and pulse pressures; normal blood nonprotein nitrogen and dextrose levels; high normal or slightly elevated blood cholesterol content; low carbon-dioxide combining power of the blood plasma; mild secondary anemia; normal absolute leucocyte count; and low normal percentage of neutrophilic leucocytes. The displacements from normal means constitute one of the features of the disturbance of homeostasis in schizophrenia. Another feature is the greater than normal range of variation of every measurement. This is demonstrated mathematically by the Worcester finding of greater standard deviations for almost every determination in patients as compared with the same determination in normal control subjects. Multiple determinations in the same patient also reveal increased variability. This "physiologic clumsiness" may be the fundamental aspect of the homeostatic fault. Hoskins (21) ventures the prediction that in many cases of schizophrenia "the essential etiology will ultimately prove to be defects of integration . . . reflected in extreme variation and atypical inter-action of various functions". In the present paper, however, the discussion is based on only the deviations from normal central tendencies.

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The most striking departure from normality is the low oxygen consumption rate. A consistently elevated basal metabolic rate in a schizophrenic subject is practically unknown. Since 1908 the literature has been concordant on the finding of a lowered basal metabolic level. "Schizophrenia", says Hoskins (19), "is a condition characterized among other physiologic abnormalities by a systematic downward displacement of the oxygen consumption rate". This trend is made more impressive by the difficulty of obtaining standard conditions of testing in psychotic subjects. According to Hoskins (23) "the true basal rate in most cases is probably considerably lower than the rate actually determined".

It seems reasonable to assume that this depressed level of basal metabolism is an integral part of the disease picture. It is not a characteristic of the person predisposed to schizophrenia. In fact, the normal leptosome (43) with his tendency to elevated basal metabolic rate, as well as tendencies to lower blood cholesterol content, increased capillary permeability, greater oxidative preponderance, increased thyroidadrenal activity, and more distinctly sympathicotonic reaction to epinephrine, shows trends opposite to those observed in the schizophrenic subject. That inanition is not a factor in the diminished oxygen use is shown by absence of correlation between weight and basal metabolic rate (r = .12). It is only in states of severe inanition as in anorexia nervosa that basal metabolism falls to levels comparable to those found in schizophrenic patients (5). Hospitalization as a cause of the altered metabolic status is ruled out in the present group of incipient cases; that it plays no part in even longhospitalized patients has been shown

recently by Hoskins (23). The use of sedatives has been invoked as explanation, but although they make for quiescence and more nearly representative readings, no evidence can be found that they depress the actual basal rate. Positively, the reversal of the metabolic tendencies, the uniformity of the finding of low oxygen consumption rate, the degree of reduction, and the tendency in most cases to rise of the rate with clinical improvement (21) leave little doubt that the lowered basal metabolism is an important feature of the schizophrenic disorder.

Investigation of the pathogenesis of schizophrenia therefore requires consideration of causes antecedent to the diminished use of oxygen. Three sets of such causes may be postulated:

1) insufficient supply of oxygen to the tissues, 2) derangement of the chemodynamic processes within the cells, and 3) disturbance of the mechanisms con-

trolling cell respiration.

The abnormality is probably not in the transport of oxygen. The arterial blood of patients contains as much oxygen as that of normal persons and the tissues of the patients abstract even more oxygen from the blood than do the tissues of the control subjects (33). Blood volume is reduced, but the deviation from normal disappears when schizophrenic subjects are matched by "nutritional index" (23). The decreased blood mass may be incidental to the hypoplastic vascular system of the leptosome. Finally, although H. Freeman (10) has twice reported diminished velocity of the blood flow under basal conditions, Finesinger et al. (6), using the same method, found the average circulation time in 130 patients to be within normal limits.

Oxygen may be supplied to the tissues in adequate amount and at an adequate rate but may fail to enter into chemical reactions within the cells be-

cause of a disturbance of enzyme action. A profitable investigation of this possibility must await more exact knowledge of biologic oxidation. Some doubt is cast upon the possible existence of a primary intracellular dvsfunction in schizophrenia by the results of the administration of dinitrophenol. Looney and Hoskins (32) found that although the drug produced an increase in the basal metabolic rate of about 50 per cent, there was no concurrent change in temperature, pulse rate, or blood pressure, only a temporary increase of the nonprotein nitrogenous blood constituents, and no consistent trend in the blood cholesterol and lactic acid values. Presumably no clinical improvement was observed. If the phenomena of schizophrenia were consequent to an altered ability of the cells to metabolize oxygen, correction of this fault should restore the vital signs and body chemistry to normal and effect clinical change.

There remains then the possible rôle of the mechanisms that regulate the speed of metabolism-the trinity of autonomic nervous system, endocrine glands, and non-hormonal chemical substances. Out of the almost infinite permutations of the interdependent functions of these vegetative mechanisms one may, a priori, isolate the factor of thyroid insufficiency. Thyroid disorders and schizophrenia grow out of the same constitutional soil. The influence of the thyroid secretion upon the brain is proved by experimental work (46) and clinical observation. The degree of reduction of basal metabolism in schizophrenia suggests thyroid deficiency; in fact it is now considered likely that a persistent change in the metabolic rate implies altered thyroid function (51).

The possibility of thyroid insufficiency as a factor in the hypometabolic status of the schizophrenic has suggested itself to several investigators. The literature was brought together by Hoskins and Sleeper (18) in 1930. Since then increased experimental and clinical knowledge has strengthened the assumption and a restatement of the "case" for the thyroid seems warranted.

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It is now recognized that hypothyroidism may exist as a part-syndrome and that uncomplicated hypothyroidism presents a variety of clinical pictures more or less distinct from classical myxedema. Reviews of the subject may be found in papers by Warfield (52) and by Seward (48). In general, these recently described forms of thyroid hypofunction are distinguished by the absence of skin infiltration and other gross signs of Gull's disease even when the basal metabolic rate is less than minus 40.

The symptomatology of non-myxedematous hypothyroidism is strikingly similar to that of schizophrenia. Common to both is a usually insidious onset, a chronic course, absence of a definite group of symptoms or characteristic physical signs, lowering of the sense of well-being, tendency to underweight (in the first half of life), loss of strength, fatigability, susceptibility to infection, carious teeth, sensitivity to cold, anorexia, constipation, abdominal complaints, headache, insomnia, vasomotor disorders of the skin and its appendages, disturbances of menstruation, and loss of sexual desire. The patients reported here offered subjective complaints in the following order of frequency: constipation, general poor health, fatigability, weakness, loss of weight, anorexia, headache, sensitivity to cold, frequent colds, insomnia, and abdominal distress. Lack of uniformity in recording the results of physical examination makes it somewhat difficult to appraise the thyroid factor from the objective data. Little importance probably is to be attached to a 28 per cent incidence of goiter in patients from the Great Lakes region (52). More significant perhaps is the finding of exophthalmos in 8.5 per cent of the cases. A pasty complexion was noted in five instances, non-pitting edema in one. A pale, cold, moist skin is one of the commonest observations. Dilatation of the pupils (not measured) was recorded in 18 per cent of the cases. Both sweating and pupillary dilatation, usually included in lists of the physical signs of schizophrenia, are among the few phenomena not part of the symptomatology of thyroid failure. Hypertrichosis and inverted hair distribution, found in 23 per cent of the female subjects, are more suggestive of pituitaryovarian hypofunction. Menstrual disorders were noted in 22 per cent of the women and tremors of the fingers, tongue, or lips in 31 per cent of all the patients. Dental caries was com-

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The concordance of the laboratory findings in schizophrenia and in hypothyroidism may be judged by comparing the data in Table I with the results obtained by Lawrence and Rowe (28) in 126 cases of uncomplicated thyroid deficiency (males, 29 per cent; females, 71 per cent). One-third of the patients were underweight, 14 per cent of prediction. Decreased weight, rather than obesity, is characteristic of the hypothyroid patient in the first half of life (21). Pulse rate was 66. In more recent reports the pulse rate is described as slow or normal or rapid. Blood pressure was 114/71, pulse pressure 43. The mean basal metabolic rate of all cases was minus 24. Blood N.P.N. was 31, dextrose, 96. Blood cholesterol and carbon-dioxide combining power were not determined. Hypercholesterolemia, it is well known, is a regular concomitant of thyroid deficiency, and in thyroidectomized ani-

mals the carbon-dioxide combining power trends to low levels (50). The blood cytological picture was: Hb, 87 per cent; R.B.C., 4,840,000; C.I., 0.9; W.B.C., 7,500; and neutrophils, 56 per cent. In the respects of lower systolic blood pressure, smaller pulse pressure, lower blood sugar level, and secondary anemia the schizophrenic patients may be said to be more "hypothyroid" than the patients of Lawrence and Rowe. The correspondence between the two conditions is seen further in the presence in schizophrenia of tendencies to reduced lung volume (20), depression of the specific dynamic action of protein food (8), low heat production in response to cold (7), hypochlorhydria (2), and delayed emptying-time of the colon (21), all of which are part of the hypothyroid syndrome (4).

So similar are the physical symptoms, signs, and laboratory findings in the two diseases that in reading the literature on hypothyroid states one has the impression of an ambiguous figure: now it is hypothyroidism, now schizophrenia. This agreement is based mainly on statistical results. To what extent does analysis of individual cases of schizophrenia bear out the thyroid factor? To ascertain this, the cases were summarized and, where possible, an endocrine diagnosis was made. Hypothyroidism was considered probable in 39.5 per cent of the cases. The summaries were reviewed by Dr. William F. Petersen, Professor of Pathology, and Dr. S. A. Levinson, Assistant Professor of Medicine and Director of the Hospital Laboratory, of the University of Illinois College of Medicine, both of whom regarded the data consistent with the diagnosis in the full 39.5 per cent of the patients, and by Dr. S. Soskin, Assistant Professor of Physiology, University of Chicago, who checked 22.5 per cent of the cases as hypothyroid. The following are summaries of cases which happened to be listed first under each of the four

customary sub-groups:

1) Simple Type: Female, age 25. History of loss of strength and energy, poor appetite, constipation, frequent colds, scanty menstruation, and emotional apathy. Skin cold and rough. Isthmus of thyroid gland enlarged. Teeth carious. About 20 pounds underweight. T 97.8, P 80, R 16, B.P. 110/75. B.M.R.—24 per cent, Chol. 277, CO₂ 56. Hb 55 per cent, R.B.C. 3,330,000, N 58 per cent. No free HCl in gastric contents, fasting or after Ewald meal.

2) Hebephrenic Type: Male, age 27. Always delicate, frequent spells of weakness, easy fatigue, constipation, headaches. Wore coat on ward in warm weather. Thyroid gland normal to palpation. Skin pale, hands and feet cold and moist. Tremor of fingers. About 35 pounds underweight. P very variable, frequently in 50's. B.P. 112/80. B.M.R.—27 per cent (after exercise—34 per cent). Chol. 333, CO₂ 52. Hb 70 per cent, R.B.C. 5,300,000, N 54 per cent.

3) Catatonic Type: Female, age 38. Three previous episodes with improvement. Stuporous. Skin cold, rough, with many eczematous areas and scars. Tendency to masculine hair distribution. Teeth in very poor condition. Thyroid gland diffusely enlarged and soft. Amenorrhea. Drooling of saliva. Deep reflexes increased, abdominals not elicited. Vincent's angina. About 40 pounds underweight. T 97.6, P 70, R 15, B.P. 98/70. B.M.R.—14 per cent (single determination). Chol. 290, N.P.N. 51, CO2 51. Hb 70 per cent, R.B.C. 3,530,000, W.B.C. 10,700, N 63 per cent.

4) Paranoid Type: Male, age 31. Impairment of general health for two years prior to admission. Felt cold even when wearing fur coat. Adenoma of

left lobe of thyroid gland. Moderate exophthalmos. Unilateral Von Graefe sign. Tremor of fingers. Weight normal. P 64, B.P. 100/65, B.M.R.—29 per cent, Chol. 278, N.P.N. 38, CO₂ 46. Hb 80 per cent, R.B.C. 4,300,000, N 45 per cent. Urine, albumin one plus.

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Among 130 schizophrenic patients Hoskins and Sleeper (18) found a group of 18 (13.8 per cent) that showed thyroid deficiency, uncomplicated or in association with other glandular

disturbance.

The greater incidence of cases of hypothyroidism in the patients of the Illinois Psychiatric Institute, as well as the larger percentage of patients in this group with low basal metabolic rates and the tendencies to hypercholesterolemia, acidosis, and secondary anemia, suggests that the Institute patients are more "hypothyroid" than the patients in the Worcester State Hospital. This difference was to be expected. The inclusion of females in the present series shifts the averages to the left. Further, the patients in Chicago are selected from a goiter region, those in Worcester from a non-goiter region.

The total evidence seems to give considerable warrant to the theory that insufficient thyroid function plays an important part in creating the vegetative status of schizophrenia. This pathogenetic tie may exist more or less in all cases of schizophrenia or may be pertinent to a certain group only. The relationship between hypothyroidism and the psychic phenomenology of schizophrenia is outside of the limits of this discussion. But the suggestion is offered that, no matter whether the metabolic and the mental characters arise simultaneously or in sequence, the hypothyroid state once established is capable of perpetuating the signs referable to the brain. Integrated brain function, as McFarland (35) and Gellhorn (12) have shown, depends upon adequate oxygenation of the brain. Anoxia induced in normal subjects produces disorders of behavior resembling the symptoms of schizophrenia. (But are acute experiments with low oxygen tension comparable to the persistent deficiency of oxygen assimilation assumed to exist in the schizophrenic brain?) In addition to the direct metabolism-depressing effect, hypothyroidism, through secondary disturbances of water and calcium metabolism (16) may exert further dampering effect upon brain activity. The assumption of thyroid insufficiency offers help too in accounting for certain physiologic and physical anomalies in schizophrenia. Since the thyroid hormone apparently controls the excitability of the respiratory center (27), its deficiency explains the schizophrenic's insensitivity to carbon-dioxide stimulation, a finding upon which Golla (14) builds a pathogenesis of the disease. The hypofunction of the sympathetic nervous system, recently emphasized by Gellhorn (13), may be the result of the decreased sensitization of the mechanisms upon which epinephrine acts. That schizophrenic subjects are unable to comply normally with the homeostatic principles concerned with the regulation of heat (15) follows from the part the thyroid hormone plays in temperature regulation apart from its control over the total heat production of the body. Finally, hypothyroidism may account for reduced blood volume (16). The influence of the thyroid secretion on capillary growth and morphology (26) may be the more basic cause, as Olkon (41) finds a reduction in the number and size of the skin capillaries in schizophrenic patients.

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Since it is generally agreed that functional thyroid disorders do not arise *ab initio* within the gland, the investigative problem becomes a search for

the cause or causes antecedent to thyroid deficiency. It is now believed that the pituitary thyrotropic hormone exercises the chief control over thyroid secretion (34). That the sympathetic nerves are not involved in the production of the hypometabolic status of schizophrenia follows from Cannon's finding that even total extirpation of the sympathetic chains in cats does not result in a significant lowering of basal metabolism (3). Our path leads to the anterior pituitary lobe; and there it ends, because the mechanisms that regulate prehypophyseal function are still too speculative to warrant consideration.

Another path opens up, however, when we bring into the discussion the remarkable resistance of schizophrenic patients to the effects of thyroid medication. The bulk of the evidence speaks against the efficacy of thyroid medication, although there are reported cases of a clear association between a schizophrenic syndrome and thyroid deficiency, with recovery from the psychosis following the use of thyroid substance (16a, 53, 54). Also, several investigators have had more or less success with thyroid therapy in unselected cases (18), and negative results, according to Hoskins, are usually inconclusive (18). There is no report on the administration of thyroxin intravenously in early cases. After a long experience with glandular treatment Hoskins (42) is impressed with the schizophrenic's high tolerance for thyroid preparations even in those cases showing the characteristic hypothyroid picture, and by the exhaustibility of the effect, as well as by the diminishing efficacy with repeated courses of treatment. If the therapeutic test is the ultimate diagnostic criterion of hypothyroidism, must one conclude that the refractoriness of the schizophrenic contradicts the assumption of thyroid deficiency? Only if by thyroid deficiency is understood just decreased production of the hormone. The above discussion has been oriented to the premise of such an absolute deficiency because this is the implicit assumption in the literature on hypothyroidism. But a relative lack of the hormone—its deficient use by the cells—is not only theoretically possible but is beginning to receive attention as an explanation of the failure of some hypothyroid patients to respond to thyroid therapy. If we suppose that the schizophrenic is unable to use thyroid secretion, we resolve the antinomy between hypothyroidism and resistance to substitutive treatment. The deficiency is probably not wholly in the utilization of the hormone since patients in a goiter area appear to suffer of a greater degree of hypothyroidism than those in a non-goiter area and some patients respond to thyroid administration, if only with temporary benefit. Inadequate iodine supply is a cause of lessened production of secretion and thus presumably a factor in the liability to schizophrenia, but iodine metabolism may not be of fundamental import because the major disturbance apparently lies not in the synthesis of the hormone but in its availability to the body.

What may interfere with the action of the thyroid hormone? Since the secretion of the thyroid gland is not identical with thyroxin and is effective only after a long latent period, it has been suggested that it undergoes modification in the body before it acquires physiologic potency (16). In the schizophrenic this final elaboration may not occur. It is possible too that the secretion or the definitive hormone may be depotentiated by anti-hormone or by some other anti-body. Anselmino and Hoffmann (1) have isolated an antithyroid substance from normal blood and tissues which exerts protection

against the hormone. In Graves' disease the titer of this principle is much less than normal. The presence of an excess of the anti-body in schizophrenic patients would account for the hypothyroid state, the resistance to thyroid feeding, and the diminishing efficacy of repeated courses of treatment, and would make unnecessary the assumption of overproduction of the thyrotropic hormone which is apparently requisite for formation of the thyroid anti-hormone. Other substances with anti-thyroid action, recently enumerated by Oehme (40), need not be considered because it is unlikely that any of them exists in excess in the schizophrenic. Finally, the hormone may reach the cells but may be unable to exert its effect because of the absence of a positive catalyst or the presence of a negative catalyst. It has already been pointed out that the results of the administration of dinitrophenol speak against such an assumption in schizophrenia.

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There is question whether thyroxin acts upon the peripheral cells at all. Experiments testing the effect of thyroxin upon the oxygen consumption of living cells in vitro have yielded negative or uncertain results (39). Isolated organs are not sensitized to stimulation by thyroxin, yet do show increased excitability if the animal is prepared with thyroxin beforehand (37). Cold-blooded animals show none of the effects of thyroxin administration (25).

On the other hand, there is evidence that the nervous system is the site of action of the thyroid hormone. Investigators like Leon Asher and Hans H. Meyer subscribe to the theory of an exclusive central action. On the assumption that cold-blooded animals are insensitive to thyroxin because they lack vegetative centers for temperature regulation, Issekutz and Issekutz (25) made cats poikilothermic by narcotiz-

ing them with a dose of phenobarbital large enough to paralyze the vegetative centers and found that they were totally unresponsive to thyroxin. Decapitated animals and animals with section of the cord in the third to the fifth cervical segments were similarly unresponsive. Phenobarbital is capable of exerting protection against the sensitization by thyroxin to the effect of drugs which disturb the temperatureregulating center (44), and in humans, of depressing the calorigenic and diuretic action of thyroxin (36). It is also known that resistance to the effects of administered thyroxin may accompany certain brain diseases (36).

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Probably the most convincing evidence that the localization of action of the thyroid hormone is in the hypothalamus is offered by Schittenhelm and Eisler (45) who found that after the injection of thyroxin into animals the iodine-content of the tuber cinereum increases tenfold whereas other parts of the brain are unaffected. In this connection it is interesting to note that Morgan and Gregory (38), in a histologic study of various cell groups in the thalamic and subthalamic regions and in the corpus striatum of the brains of psychotic subjects, twelve of whom had been diagnosed schizophrenic, found pathologic changes only in the tuber cinereum—the substantia grisea and the nucleus tuberis lateralis.

Just how the hypothalamus mediates the effect of the thyroid hormone is not known. The sympathetic nerves would seem to be a necessary link between the brain and the cells and a certain amount of evidence supports this assumption, yet Ring, Dworkin, and Bacq (47) have reported that removal of the thoraco-lumbar chains in cats does not prevent the usual rise in metabolism after thyroxin.

On the strength of this newer knowledge of thyroid physiology the opinion

is ventured that in schizophrenia we deal, not with a disturbance of the pituitary-thyroid mechanism, but with a dysfunction of the hypothalamus. Neither the naturally produced hormone nor the exogenously introduced hormone is effective because of the elimination of the mechanism which in some way is essential to the hormone's ultimate action. That the hypothalamus may be implicated not alone in schizophrenia but in the psychoses generally has been suggested by persons of such wide experience as Singer (49), Hoskins (22), and Ingham (24). The postulate of a thyroid-hypothalamus relationship offers a way of approach to the experimental testing of the rôle of the hypothalamus in the psychoses.

SUMMARY AND CONCLUSIONS

As a point of departure in a study of autonomic integration in schizophrenia the vegetative status was defined by making a statistical analysis of the organic findings in a reasonably homogeneous group of 129 schizophrenic patients. The most noteworthy abnormality is a tendency to low oxygen consumption rate. Low blood pressure, slightly elevated blood cholesterol content, low normal carbon-dioxide combining power, and secondary anemia attest to a state of general hypometabolism. The female subjects are relatively more hypometabolic than the male subjects. The clinical subgroups show no consistent differences.

Low oxygen consumption is probably an integral feature of the disease. Since it does not seem to be dependent upon an inadequate supply of oxygen to the tissues or upon intracellular enzyme dysfunction, a disturbance of the mechanisms regulating cell respiration may be postulated. Thyroid insufficiency is probably one factor in the

pathogenesis. The symptoms, physical signs, and laboratory findings in schizophrenia and in the non-myxedematous form of thyroid failure are very similar and in the group of patients reported the diagnosis of hypothyroidism is believed tenable in 39.5 per cent of the cases. These patients are apparently more "hypothyroid" than patients studied in the Worcester State Hospital who are males exclusively and who are selected from a non-goiter region.

Thyroid hypofunction serves to explain some of the mental as well as the metabolic phenomena and accounts for certain physiologic abnormalities commonly observed in schizophrenia.

The schizophrenic's lack of response to thyroid feeding does not necessarily nullify the postulate of thyroid insufficiency since the thyroid hormone appears to act through the hypothalamus and a diencephalic disturbance would account for both the hypothyroid state and the resistance to the effects of administered thyroid substance. The thyroid insufficiency may be relative rather than absolute.

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PSYCHIATRIC CHANGES ASSOCIATED WITH INDUCED HYPERTHYROIDISM IN SCHIZOPHRENIA*

Louis H. Cohen, M.D.

OF THE DATA which have accumulated on the endocrine factors in mental disease, probably the most extensive are those which bear upon the rôle of the thyroid gland in schizophrenia. The investigations which have been reported have approached the problem from various different standpoints. The clinical method, following the formulations of Kraepelin on schizophrenia as a metabolic disorder in which the thyroid gland is probably involved, has vielded considerable data bearing on the similarities and differences of "thyroid psychoses" and schizophrenia. Of especial interest is the implied or frankly stated inference that the association of hyperthyroidism and schizophrenia is very rare, if it exists at all. The metabolic approach has yielded considerable information, most of which tends to indicate that schizophrenia is characterized by a general depression of the metabolic rate and of the associated physiological functions. From a pathological standpoint, many investigators have reported the occurrence of lesions of various sorts in the thyroid gland. And with the therapeutic approach have come data which indicate that thyroid medication in varying dosages may in some cases have beneficial effects on the clinical course of the illness. It may generally be stated that under none of these particular categories is there unanimity of opinion concerning the reliability or significance of the relationships observed.

The present investigation deals with

the psychiatric changes observed under massive and prolonged thyroidization of a small group of very deteriorated schizophrenic patients.

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The physiological changes associated with the regime that was employed have been reported elsewhere.1 Briefly, it was found that the physiological effects of thyroidization in this group of patients were as follows: increased basal metabolic rate, weight-loss, increased systolic blood pressure, decreased diastolic blood pressure and increased pulse pressure, increased pulse rate, diminished circulation time, increased erythrocyte count, increased total nitrogen in the blood and urine, and increased urinary creatine. No significant change or only random variation was observed in body temperature, leucocyte count, and the sugar, cholesterol and creatinine levels in the blood. The present investigation is concerned solely with the psychiatric changes which could be observed over the same period of study. For purposes of simplicity only the maximum resting postabsorptive oxygen consumption rate (O.C.R.) obtained during the medication periods is indicated for each patient.

GENERAL PROCEDURE

Eight male sch zophrenic patients, each of whom was in a state of advanced "leveled out" deterioration,

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¹ Cohen, L. H. and Fierman, J. H.: Metabolic, cardiovascular, and biochemical changes associated with experimentally induced hyperthyroidism in schizophrenia, Endocrinology, 22: 548-558, 1928.

were selected as subjects. These patients ranged in age from 24 to 37 years of age, and had been in the Worcester State Hospital from 4 to 20 years each. The investigation was begun on October 27, 1935, and continued until October 13, 1936 (353 days) in two cases, until November 5, 1936 (376 days) in five cases, and until May 20, 1937 (572 days) in one case, an

average period of 395 days.

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Desiccated thyroid substance (Armour's U.S.P.) administered orally under careful supervision was used throughout the investigation. The physiological and psychiatric observations were conducted on the same schedule throughout the study. This was divided into five periods: a) the pre-medication period, lasting about 21 days; b) the first medication period, during which the patients were started on 6 grains of desiccated thyroid per day, and increased slowly by 3-grain rises to a maximum of 15 or 18 grains per day, this period lasting roughly 95 days; c) the inter-medication period, during which no thyroid was administered, this period lasting approximately 67 days; d) the second medication period, during which thyroid was again given, beginning with 6 grains per day and increased by 3 grains per day every other day until the maximum for each patient of the first medication period of 15 or 18 grains per day was reached (this took from 9 to 12 days); the patients were kept at this maximal medication for an average period of 69 days, with the exception of one patient (#2, M.B.), whose thyroid dosage was increased by 3-grain rises until a maximum of 36 grains per day was reached and whose medication period lasted 241 days; and e) the post-medication period, during which no thyroid was administered, this period lasting about 118 days. At no time during this entire investigation was any other medication administered.

The patients were kept under strict supervision on the ward and in fine weather were allowed one or two hours of outdoor daily exercise. An attempt was made to maintain the patients' weight, since it was felt that marked weight loss would militate against the specific significance of any physiological or psychiatric changes. For this reason they were given extra feedings. Generally, thyroid medication was suspended when the patient's weight loss, despite forced feedings, reached 10 to 15 per cent of his initial body weight.

CLINICAL DATA

Patient #1, L. A., was a short, slight, 30year-old white male of French stock, who was admitted to the Worcester State Hospital in 1922. During the pre-medication period he was observed characteristically to stand motionless in a corner of the ward with an expressionless face, his eyes open. He obeyed commands in an automatic manner. He was generally mute but occasionally gave monosyllabic responses to persistent questioning. He was completely passive to physical attacks, and had to be spoon fed. The first medication period, which lasted 105 days, was characterized by a maximum dosage of 15 grains per day, which was administered during the last two months of this period; the maximum O.C.R. was 132. For the first two weeks his usual clinical picture persisted, but following this his behavior was characterized by much over-activity. He began to talk. His appetite became voracious. He had outbursts of irritability, stubborness, and aggressiveness which lasted for short periods of time. From time to time, however, he became quite apathetic and drowsy. In the inter-medication period, which lasted for 70 days, the patient was found after the first two weeks to be untidy, confused, and quasi-stuporous. It again became necessary for him to be spoon-fed, the general picture becoming about the same as that of the pre-medication period. The second medication period lasted for 57 days; the maximum O.C.R. was 139. After two weeks the patient had again begun to talk, his appetite again became voracious, and the outbursts of impulsive activity and irritability recurred, again punctuated by periods of stubbornness and untidiness. In the *post-medication period*, lasting 123 days, the patient's condition remained unchanged for the first five weeks, after which he again gradually began to slip into stupor. He again had to be spoon-fed, became untidy in his dress, and occasionally was incontinent.

Patient #2, M.B., was a short, stocky 37year-old Russian-Jew who was admitted to the Worcester State Hospital in 1917. During the pre-medication period he presented a characteristic picture of dishevelment. He moved about the ward rapidly with a shuffling gait; his activity was mainly purposeless. His speech was rapid, often irrelevant, and his answers evasive. He had occasional short-lived outbursts of irritability. He was correctly oriented, and his memory was good, but judgment and insight were badly impaired. He was frequently heard to say, "Get off my face"! "Get away from me"! but hallucinations and delusions were denied. The first medication period lasted 105 days and the maximum dosage of 18 grains per day was administered during the last month of this period; the maximum O.C.R. was 121. During this time the patient's appetite became ravenous. He became much more untidy in his dress and was very difficult to manage on the ward. His speech and movements were generally speeded up, and his motor co-ordination seemed to become more clumsy. During the inter-medication period of 90 days the patient's general activity diminished considerably. He became more co-operative on the ward. His speech and movements slowed down considerably, but his appetite remained ravenous. The second medication period lasted 241 days and a maximum O.C.R. of 274 was reached. Although his original maximum daily dosage of 18 grains had been reached after 12 days, it was decided to increase this dosage by 3-grain rises in order to investigate the changes which might then occur. For the last month of this period his daily dosage was 36 grains per day. His activity again speeded up. He became an open masturbator, a form of activity which had not previously been conspicuous. His speech, although relevant became more disjointed, and motor clumsiness recurred. His appetite was persistently voracious. It became impossible to get him to work on the ward or to carry out any commands efficiently. In the post-medication period of 135 days the patient after three weeks had again become more quiet. He again became co-operative and did some ward work, but his untidiness persisted. His appetite remained ravenous for about three months and then again became normal. Masturbation ceased, or at least became inconspicuous. His motor co-ordination improved and his speech became less rapid.

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Patient #3, P. B., was a short 30-year-old Russian-Jew who was admitted to the Worcester State Hospital in 1929. During the pre-medication period he was usually to be found sitting quietly on a bench on the ward with an expression of blank resignation. He held his arms stiffly crossed in front of him, moving his hands and feet in a peculiar manner. He was usually mute, but sometimes his lips moved inaudibly. He spilled his food and drink over his clothes. He washed his hands frequently. He obeyed simple orders in an automatic fashion, and was apparently entirely indifferent to everything which was going on about him. The first medication period lasted 77 days; the maximum dosage was 15 grains per day, and the maximum O.C.R. was 173. After about two weeks he became quite restless, and as time went on this became more pronounced. His appetite became voracious. After three weeks he began to talk, an extraordinary occurrence, since he had been mute for many years. His speech was markedly perseverative. When asked his name or address he gave it over and over; when asked to name objects he did so in a repetitive fashion, not ceasing until another object was presented to him for identification. His writing was similarly perseverative. From time to time, however, he became entirely mute, although occasional lip movements were noted. There was marked general hyperactivity. In his continual haste he dressed himself very quickly, spilled food over himself, and frequently was to be observed running about the ward. At this time also marked and continual choreo-athetoid movements, especially of the upper extremities, were noted, but simple coordinative tests were carried out quickly and efficiently. During the inter-medication period of 49 days his voracious appetite persisted. He again became entirely mute and soon apparently completely indifferent to everything except the call for meals. He was again generally to be observed standing in a corner of the ward for several hours at a time. The second medication period lasted for 84 days; the maximum O.C.R. was 168. After two weeks he again began to talk in the same repetitive manner as noted previously, his writing showing the same perseveration. The peculiar choreo-athetoid movements again became noticeable. His motor activity increased steadily. He again became extremely untidy, and raced about the ward. He frequently was found standing before the mirror, brushing his hair with a floor brush. From time to time, however, he became mute and markedly under-active. He frequently dressed and undressed himself on the ward in a rapid manner In the post-medication period of 145 days his hyper-activity diminished but his appetite persisted for three months after medication had been suspended. The hair-brushing activity persisted for four months, but except for this single activity, his behavior was again characterized by standing in a corner of the ward with a blank expression on his face. Sometimes he was incontinent.

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Patient #4, L. C., was a tall, gangling, 27-year-old Jewish male who was admitted to the Worcester State Hospital in 1930. During the pre-medication period his characteristic behavior was observed to be one of careless slouching about. His speech was abrupt, fragmentary, bizarre, and often incoherent. He had some disjointed, grandiose delusions. He was easily irritated and was frequently aggressive. His memory was poor and there was a marked tendency to confabulation and neologizing. He was well

oriented. He did no work. There were occasional auditory hallucinations, the contents of which could not be adequately determined. He recognized that he was mentally ill, but his silliness indicated that such insight was not very penetrating. In the first medication period, which lasted 105 days, the maximum dosage was 18 grains per day, and the maximum O.C.R. 175. He became increasingly restless and almost continually assaultive. He became more dilapidated in his personal appearance. At increasingly shorter intervals and for more and more prolonged periods of time he manifested extreme excitement during which sedative treatment (packs) became necessary. His appetite was voracious. His delusions remained disconnected and bizarre and his hallucinatory activity remained apparently the same. He became an open masturbator. As time went on his restlessness became almost unmanageable. In the inter-medication period of 70 days the patient's hyper-activity subsided. He became very quiet and frequently went to bed, for days at a time refusing to move. He occasionally became irritable but was not assaultive. Only occasional masturbation was noted. The second medication period of 67 days was characterized by a maximum O.C.R. of 188. His restlessness again became extreme. His appetite, which had not diminished during the intermedication period, remained voracious. Masturbation again became more conspicuous. He became quite dilapidated in his personal appearance, rubbed tar into his hair, and became unmanageable on the ward. Occasional tremors of the outstretched fingers were noted. In the postmedication period of 90 days the patient again became normally active and quiet. He became less untidy and was frequently found lying on the bed or on the floor. His voracious appetite persisted for almost three months. From time to time he had irritable outbursts but was easily calmed down.

Patient #5, V. C., was a tall, poorly nourished, 25-year-old white male of English-Irish stock who was admitted to the Worcester State Hospital in 1928. During the pre-medication period he presented the

clinical picture of extreme dilapidation. He sat in a corner staring vacantly ahead, appeared dazed and lethargic, and occasionally made gurgling, whimpering, and grunting sounds. His speech was meagre, with echolalia, verbigeration, and wordsalad formation. He was able to obey only the simplest commands. He was very untidy in his eating and toilet habits. He frequently handled his genitalia, but frank masturbation was never noted. No delusions or hallucinations could be elicited because of the marked fragmentation of speech. During the first medication period of 105 days the maximum dosage reached was 18 grains per day; the maximum O.C.R. was 134. His general activity was early characterized by a general speeding up. He became destructive. His movements became more clumsy and jerky. The echolalia and verbigeration became much more pronounced, and there was frank push of speech. His overactivity alternated with periods of inactivity, which amounted at times to frank stupor. There was considerable persistent masturbation. In the intermedication period of 74 days the picture of general "lifelessness" again supervened, the patient showing almost typically puppydog behavior. During the first two weeks he was continually incontinent but this improved. His formal speech disturbance became the same as that of the pre-medication period. During the second medication period, which lasted 63 days, the maximum O.C.R. was 142. His appetite increased. The echolalia and verbigeration became more marked. He became much more untidy, frequently exposed himself, and masturbated openly. From time to time he became frankly stuporous, with cerea flexibilitas; during these periods his movements became very slow and he was incontinent. Sometimes he was merely torpid, frequently falling asleep. In the post-medication period of 80 days the patient became progressively more alert. He showed some spontaneity of activity but periodically relapsed into stuporous states which became less frequent as time went on. The final picture was the same as that noted before medication was begun.

Patient #6, J. H., was a small, poorly

developed 30-year-old white male of Irish stock, who was admitted to the Worcester State Hospital in 1921. In the pre-medication period his characteristic behavior was that of an irresponsible child trotting about the ward. His speech was often irrelevant but he answered simple questions readily and accurately. His range of general information seemed to be limited to his ability to name the capital of every state of the union; he was entirely ignorant apparently of everything else. There was no evidence of hallucinations or delusions. The first medication period lasted 77 days, with a maximum dosage of 15 grains per day; the maximum O.C.R. was 144. His activity became characterized by great variability. There were periods of hyperactivity during which he raced around the ward, picked at himself, assaulted other patients, and destroyed furniture. Masturbation and overt homosexual approaches became marked. His appetite became voracious. But alternating with these periods, and as time went on, more constantly, there occurred intervals of stuporousness during which he lapsed into listless behavior; he was confused, refused to carry out any commands, and merely sat about or lay on his bed in an indifferent and dilapidated fashion. The inter-medication period of 49 days was characterized almost immediately upon cessation of medication by the patient's greater alertness. He again began to carry out commands in his former brisk fashion and to take some pride in his personal appearance. His appetite became diminished. His general overactivity became markedly attenuated, and overt sexual misbehavior was no longer noted. During the second medication period, which lasted 84 days, the maximum O.C.R. was 162. He again became over-active and over-talkative. His appetite increased and he again showed marked sexual interest in the other patients. He was observed to masturbate frequently. However, such periods of over-activity again gave way to a state of drowsiness, listlessness, and confusion, punctuated by attacks of assaultiveness upon other patients and upon himself. He became quite unmanageable from time to time and required sedation

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(packs). Toward the end of this period the listlessness became continual and extremely pronounced. In the post-medication period of 145 days the voracious appetite persisted for three months, when it again became normal. His listlessness persisted during the early part of this period but was gradually replaced by more frequent and more pronounced outbursts of irritability and pugnacity. After a time, however, the picture characterizing his status during the pre-medication period again

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able tion supervened. Patient #7, C. McD., was a very short, slight, poorly developed, 37-year-old white male of Irish stock, who was first admitted to a mental hospital in 1924 and was transferred to the Worcester State Hospital in 1930. During the pre-medication period he was to be observed lounging about the ward, disheveled, huddled on the edge of a window-seat or rocking back and forth on his heels. Answers to questions were brief but relevant. He worked about the ward in a desultory fashion. He was well oriented, his memory was fairly accurate, and his insight was fairly good. There was no evidence of hallucinations or delusions. In the first medication period of 105 days the maximum dosage was 18 grains per day; the maximum O.C.R. was 179. After the first month of medication it was noted that the patient spent practically all his time rocking back and forth on a settee on the ward. His appetite increased tremendously. He manifested occasionally short-lived irritable outbursts. Sometimes he was found standing before the mirror, wetting his hair and combing it with a brush for long periods of time. He became a constant and open masturbator, and although he would cease masturbatory activity on command, it was only a minute or two before he had resumed it. His orientation, memory, and insight remained unchanged. During the inter-medication period of 57 days the patient's rocking activity continued for about six weeks and then ceased. Masturbation became less frequent, and the irritable outbursts disappeared. His appetite remained voracious. The hair-combing activity, however, persisted. In the second medication period, which lasted 70 days, the maximum

O.C.R. was 148. Within a month the patient's irritable outbursts and rocking activity had recurred. He became very untidy. Masturbation became more frequent, but not as much so as during the first medication period. An additional form of activity made its appearance in the form of constant dressing and undressing performed with remarkable quickness, the patient dressing himself on command whenever he was found undressed, but immediately resuming his dressing and undressing activity. His appetite remained quite ravenous. During the post-medication period of 123 days he became generally more quiet and fairly tidy. Masturbation became less frequent. The appetite became less voracious. The dressing and undressing activity, however, remained about the same, but as time went on became somewhat less frequent. Incontinence sometimes occurred.

Patient #8, F. P., was a slight, poorly developed white male, age 24, of French descent, who was admitted to the Worcester State Hospital in 1932. During the premedication period his general behavior was characterized by striding about the ward, his head down, an expression of concentration and irritation on his face. He ignored everyone but carried out most requests. Frequently he was seen shadowboxing, often striking himself on the face or body. His appearance was very neat and he spent much time before a mirror, arranging his necktie. He was usually mute, and although on rare occasions he answered monosyllabically, it was impossible to get at his content of thought. The first medication period lasted 77 days. The maximum dosage was 15 grains per day and the maximum O.C.R. was 155. During this period irritable outbursts were noted, but these did not seem unusual. The mutism persisted. He became somewhat more selfassaultive. He continued to pick at his skin. His appetite became quite large but not voracious. In the inter-medication period of 98 days the increased appetite persisted but there was no other change with respect to his general activity or mutism. During the second medication period of 57 days a maximum O.C.R. of 142 was reached. For the first time the patient became untidy. Occasional twitching about the mouth was noted. He struck at himself much more frequently but there was no apparent change in the number of his irritable outbursts. He began to comb his hair, much in the manner of Patients #3, P. B., #4, L. C., and #7, C. McD., standing before the mirror for long periods of time. His appetite became somewhat increased. During the post-medication period of 100 days the patient became definitely less active. The twitching about his mouth became diminished. He persisted in striking himself and picking at his skin, but this became less frequent. The hair-combing activity persisted unchanged. His appetite remained increased for about two months and then resumed its former level.

With respect to the clinical changes noted on general physical examinations it must be pointed out that in none of the patients during the whole study period was any disturbance of gastro-intestinal function, such as vomiting, constipation, or diarrhoea, noted. Perspiration was never noted to be excessive. There was no exophthalmos. The pupillary reactions did not change. In one patient (#3, P. B.) more marked choreo-athetoid movements were noted. In one (#4, L. C.) occasional tremor of the outstretched fingers during the second medication period only was observed. In two (#5, V. C., and #8, F. P.) twitching of the face was occasionally to be observed.

Discussion and Conclusions

In the present study the psychiatric changes attendant upon prolonged hyperthyroidization in 8 deteriorated schizophrenics have been reported. Dessiccated thyroid (Armour's, U.S.P.) in oral dosages up to 15 or 18 grains per day, was administered over two separate periods and the concomitant physiological and psychiatric variations investigated. In one patient the daily dosage of thyroid was increased to and maintained at 36 grains per day. The more important physiological changes,

reported elsewhere,2 were generally of the nature of increased oxygen consumption rate, body-weight loss, increased pulse pressure, increased pulserate, and diminished circulation time. No clinical evidence of hyperthyroidism was noted from general physical examination in any of the patients except for occasional twitching in the face, or tremor of the outstretched fingers in very few of them; in one patient choreo-athetoid movements became more marked. These signs disappeared when medication was suspended.

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The outstanding psychiatric change observed was general hyperactivity, sometimes with increased clumsiness and jerkiness. Hyperactivity, in some of the patients, also took on specific pathways of expression such as in sexual behavior of the nature of constant masturbation, or as continual dressing and undressing, or hair-combing. In addition to the hyperactivity, there was also found in three of the patients quite the reverse form of disturbance, namely torpor, of an episodic or persistent sort, which sometimes occurred when medication was at maximal dosages. Hyperactivity was in many cases accompanied by marked irritability.

All of these patients at the beginning of the investigation were in an advanced state of intellectual deterioration. There occurred no changes in these functions which could be ascribed to thyroidization. Orientation and memory-capacity, when they could be tested, were found throughout the study to be unchanged. Insight (or better, the lack of it) also remained unchanged. Throughout the investigation there could be observed no general change in the delusional or hallucinatory symptoms in cases where they were present.

² See footnote 1, p. 414.

It is felt that, as a total picture, these data represent relatively slight clinical effects for the extreme dosages of a substance such as thyroid. One would expect that the physiological changes induced by the degree, and maintenance, of thyroidization under the conditions of this investigation would be reflected clinically in a marked manner, but this was not observed. Although it is well known that the mere administration of thyroid substance to human subjects is not sufficient for the experimental production of Graves' disease, it seems very unusual that in none of the 8 schizophrenics studied were any of the physical symptoms commonly found in hyperthyroidism clearly demonstrable. And, from the psychiatric aspect, the clinical findings were also relatively minimal.

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But it is in this very paucity of effect that these data seem most significant, for they throw some light upon the nature and changeability of the disease-process from which all these patients were suffering. Due to lack of explicit control material it cannot be said that the effects are characteristic of schizophrenia, but it is quite probable that this is the case. The experimental conditions were such that a powerful exogenous factor was introduced into the schizophrenic diseaseprocess. The psychotic symptoms of the early or acute productive phases of the disease-process have usually disappeared. The patient is listless and indifferent, or manifests an almost continual silliness. He carries on no intellectual operations which demand sustained attention. There remain only the simple, highly-automatized, psychomotor activities such as walking, talking, eating, masturbation. It is upon such a reduced, "shrunken," defective organism that thyroid, as an exogenous factor, must act.

Of considerable psychiatric interest, therefore, is the observation that, under these conditions, the changes in the clinical symptom-picture seem to have been confined rather strictly to the sphere of the more simple psychomotor activities. It is a general rule that thyroid medication "speeds up" activity; the present group of schizophrenic patients were no exception to this rule. Their uniqueness as subjects consisted in their personality-destruction. The effect of thyroid was sufficient to increase their "energy", so that marked hyperactivity was brought about. The inference may be drawn, therefore, that even in individuals who furnish so defective a substrate for thyroid activity, "energy" for increased activity is still potentially available.

These changes, however, were not of the nature of changes in the thenexisting psychotic constellation. None of the defects characteristic of the schizophrenic process in any of the patients were overcome. Furthermore, the usual psychiatric manifestations of states induced by stimulating exogenous agents were not brought about in these patients; hallucinatory expressions, bizarre delusional formations, illusions, and other distortions of sensation and perception, which comprise the usual picture, were not observed. It appears, therefore, that no meaningful elaborations of perception or of thinking or of complex psychomotor activity were produced. The conclusion may be drawn therefore, that due to the state of deterioration which characterized all these patients, the manifestations of the energy change were not qualitatively differentiated from those observed under conditions of non-medication.

The question arises of what possibilities for change do exist for such "burntout" individuals. Given so defective a substrate it would be probable that changes could become manifest only within the limits of expressibility which such an organism still retains. The narrowness of these limits is a direct function of the severity of personalitydestruction which the individual has undergone. One would expect to observe, as specific manifestations of induced hyperactivity, merely the exaggeration of rather simple, primitive expressions, i.e., the manifestations of highly-automatized functions. Furthermore, with an armamentarium of only severely limited personality-functions, one would expect that as the organism is "pushed" more and more, as by continual thyroidization, an outlet is provided only in the repetition or perseveration of these same automatized activities. The observations recorded bear out these assumptions. Those patients who were mute or nearly so (Patients #1, L. A. and #3, P. B.) began to talk, the latter with perseveration; the echolalia and verbigeration of Patient #5, V. C. became more pronounced than before. The rocking activity of Patient #7, C. McD. became almost continual. The frequent hair-brushing activity (Patients #3, P. B., #7, C. Mc D., #8, F. P.), the repetitive masturbation (Patients #2, M. B., #4, L. C., #5, V. C., #6, J. H., #7, C. McD.), and the constant dressing and undressing activity (Patients #3, P. B., and #7, C. McD.) furnish further examples. It is in the very "speeding-up" and perseveration of activities such as these, activities which characterize the lives of deteriorated schizophrenics, that the changes observed may be said to denote quantitative variation.

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SUMMARY

The psychiatric changes produced in a group of 8 deteriorated schizophrenic patients given large dosages of desiccated thyroid (Armour's U.S.P.) over long periods of time have been studied. Although physiological changes, reported elsewhere (1), were considerable, general clinical evidence of hyperthyroidism was lacking. The psychiatric changes observed were confined almost exclusively to the simple psychomotor activities. The findings are interpreted to indicate that, under such conditions, no qualitative change in mental activity is produced. But there is a quantitative increase in the repetition and perseveration of the primitive, highly-automatized activities which characterize the lives of deteriorated schizophrenics.

REVIEWS, COMMENTS, AND ABSTRACTS

RECENT LITERATURE RELATIVE TO THE PSYCHIATRIC ASPECTS OF GASTROINTESTINAL DISORDERS—A REVIEW

A. Louise Brush, M.D.*

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IN A CAREFUL REVIEW of recent literature on gastroenterology Chester Jones and others (12) make the following statement: "It is of interest that more and more scrutiny is being directed towards the relationship between the central nervous system, the autonomic nervous system, and the digestive tract. The importance of the psyche in its influence on the digestive tract is being more clearly and, logically presented". Jones' article, covers the literature of 1937 and the first half of 1938. Some papers not mentioned in his review, as well as a few more recent ones. (Menninger, Wilbur and Washburn, Epstein, MacLeod, Wakefield and Mayo, Sullivan, Bargen, and Jackman and Kerr) will be briefly reviewed here, in an effort to clarify the present status from the psychosomatic point of view.

Physiological and Psychological Factors

Stomach: Jones and his associates make some interesting observations concerning the precipitation of attacks by environmental situations, personality factors, and management of cases. He cites a paper by Wilhelmj (24) and others, showing that the psychic phase of acid secretion can break through inhibitory effects produced by the presence of acid in the stomach: "The secretory energy of the psychic phase can exceed that due to the intragastric or

intestinal phase, and it is believed possible for it to reach a degree of hyperacidity unattainable by the other two phases alone". In regard to acid and ulcer, the main conclusion is that acid gastric juice in itself is not sufficiently destructive to overcome other forces which inhibit or prevent gastroduodenal ulceration.

Necheles and others (17) studied in dogs and men, the effects of stimulating the parasympathetic system. They found that acetylcholine was liberated and that an anoxemia of the tissues occurred. They advanced the hypothesis that this may be a basis for the development of an ulcer. After reviewing the recent literature on histidine treatment of ulcers, quoting numerous workers, including Willhelmy (25), and Upham and Barowsky (21), they say: "A review of these and similar studies leads one to the conviction that histidine as a therapeutic agent in the treatment of ulcers is of only temporary value, and that favorable results obtained are largely due to psychotherapeutic effects, which follow the parenteral injection of any nonspecific substance".

Epstein (9), writing on functional spasms in children, involving the gastrointestinal, as well as other systems, feels that the majority are of functional origin, and emphasizes the important point that much care is needed in the early handling, for they may become the basis of neurosis in later life. In addition to medical treatment, he stresses environmental control.

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MacLeod (14), studying cascade stomach, in a patient so sick that he was gasping for breath, found that the patient was swallowing air in large amounts. When this was stopped he was well in three days. MacLeod feels that air swallowing in nervous patients is often the basis for other symptoms of this sort.

A very interesting paper by Wilbur and Washburn (23) reviews 140 cases of functional vomiting; 64 per cent were between the ages of 20 and 40, 80 per cent were females, and 75 per cent vomited at least once a day. He says that in many it had gone on for so long that they had forgotten the precipitating emotional factors. "The methods of treating functional vomiting vary widely, and include all the known methods of treating neurotic patients. In a final analysis psychotherapy is of tremendous importance in the treatment of the patient". Forty-three percent of his group had been operated on previously because of the vomiting. In all cases the vomiting had returned and persisted post-operatively. In his group 50 per cent of 97 follow-ups, in a two to eight year period, had been completely relieved. He does not go into adequate detail as to the type of psychotherapy used, and the personality of the patients studied.

Chapell and others (4), worked with two groups of ulcer patients, one as a control group, receiving only medical treatment—diet, powders, etc.—the other receiving the same treatment plus lectures on psychosomatic relationships, the effect of worry on the body, and so on. Over a three year period this group did better in every way than the control group. They do not go into detail, but one gets the impression that this was all group work, and the individual patient was helped a good deal, without individual therapy. It should be noted that this

is evidence to indicate that with individual therapy even better results could be obtained.

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Further work on the emotional factor is that of Davies and Wilson (6), They found in a study of 205 cases of ulcer, 84 per cent of them had symptoms starting after some emotional upset due to difficulty in work, family affairs, or finances. These patients appeared to have been under undue tension for a long time before their ulcers started. Jones writes, in commenting on this: "The conclusion that successful therapy depends on attention to the 'whole man', his work and his anxieties as well as his diet, is not original, but is nevertheless of great importance since even a superficial survey of the literature reveals innumerable conclusions as to the specificity or importance of various therapeutic maneuvers with a fine disregard of the known history of this chronic disease". Again probably the personality of the patient rather than the work difficulty or other environmental influence needs stressing.

Menninger (15) in a paper which Jones did not mention in his review, emphasizes the fact that "There is probably no other organ system which shows such fine intergradations between 'functional' and organic changes as those reflected by the gastrointestinal tract", and "Probably more often than in any other set of organs in the body do long-standing, chronic, so-called functional disorders result in structural changes in the tissues, as seen for instance in ulceration of the stomach, duodenum, or colon". He says that in looking over these papers he finds most gastroenterologists agreeing that at least 50 per cent of cases fall into so-called functional groups. In reading about 50 papers by internists and gastroenterologists, he found none where

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finds that into these cases were of psychogenic origin. He emphasizes that this was true in spite of the recent work of Alexander and others (1) in 1934, on types of personality and emotional conflicts in gastrointestinal disturbance, and of Sullivan's paper on personality types in gastrointestinal upsets. Menninger outlines personality types occurring in different kinds of gastrointestinal up-

the aid of psychiatry was thought

necessary, although the majority of

Colon: Bargen, Jackman and Kerr (2) in a paper on chronic colitis report that: "In recent years the number of cases in which complete regression of the disease is seen to have taken place, has been greatly increased". By proctoscopic and X-ray examination, 16 males and 12 females were seen to have lost all sign of disease, and were symptom free. "It is safe to assume that in many of the cases in which, in later tables the patients are referred to as symptom free, the same happy state of affairs is present. Not represented among these are many patients free from all symptoms or signs of disease for from seven to fourteen years". The cause of disease in 29 of these cases was listed as "physical and mental fatigue". Causes for 567 cases were "undetermined". In the treatment many different medicines were used, and no drug was found to be successful in any large number of cases, although good results were obtained in a few cases by various drugs. The paper goes on to say that a patient must adopt the philosophy of life which the patient with a peptic ulcer is supposed to have. From the psychosomatic angle, one cannot help wondering whether some of the increase in cases which have shown complete regression in recent years has not been due to the fact that they were better handled in the early stages, before the malfunctioning had had a chance to develop so much

pathology. It would seem that many of these patients need real psychiatric help, and that merely giving them a philosophy of life is not in itself enough, unless that is also meant to include giving them an understanding of their own personal needs and reaction tendencies.

A recent report from the Mayo Clinic, by Wakefield and Mayo (22) entitled "Functional and Sociological Disorders of the Colon", states that a disorder in the function of the colon is a result of social conditions such as "sickness, accident, unexpected loss of money, property or job, death of a member of the family, betrayal of confidence by a friend, change of party, church or occupation". "This disorder is manifested by irregularities of defecation and apparent alteration in the absorption and secretory function of the colon. It is frequently associated with abdominal discomfort, pain, and often with mucous in the feces, and subjective abdominal distention". They emphasize the point that it is important to gain the patients' confidence and if possible to change the environment rather than merely to use medicine, or treat them for colitis by the usual methods. As Dunbar (8) has said, we often think of the immediate environment as a real cause of illness, whereas it is usually only a precipitating factor.

Other recent work is that of Brown, Preu and Sullivan (3), from the Psychiatric and Medical Division of the New Haven Hospital, giving a report on ulcerative colitis and personality; they mention the work of Murray (16) in 1930, and Sullivan and Chandler (20) in 1932, who reported a small series of cases in which there was a very definite relationship between the onset of bloody diarrhea and emotional disturbance. The report (3) notes how little attention has been paid to the previous work and the need again to draw the attention of medical men to the importance of emotional disturbances and the general personality of patients with nonspecific ulcerative colitis. In a series of nine cases with definite diagnosis of ulcerative colitis, they found 1) poor heredity from the psychiatric standpoint, 2) that the patients have "low energy, and are emotionally labile and apprehensive passive, egocentric, and dependent", and 3) most important, that in eight out of nine cases the onset of ulcerative colitis occurred at a time when the patient was emotionally tense and upset by a difficult life situation. It is interesting that they report "no specific type of precipitating factor was found, but in each case in which the relationship was observed, the patient had been involved in an adjustment which was difficult for him as an individual, and to which he responded with tension and anxiety". They go on to say: "It is not maintained that emotional disturbances 'cause' ulcerative colitis. The possible importance of fundamental gastrointestinal instability needs to be considered as well as the possible importance of bacterial invasion. Still other factors may play a rôle. The results of this study indicate, however, that in a certain type of personality, which is here described, ulcerative colitis may be precipitated by emotional disturbances".

Cullinan (5) and Wittkower (26) made a careful study from the medical and psychosomatic angles of forty unselected cases diagnosed ideopathic ulcerative colitis. Cullinan notes that the onset of illness was early but that the patients consulted doctors late because they felt relatively well, and also that there are few illnesses in which a patient can become so sick and emaciated and still recover. Wittkower notes that over half of the patients gave a his-

tory of emotional trauma "serious enough to be regarded as a precipitating factor immediately preceding the onset of the disease". Also, twenty of the patients themselves mentioned emotional factors such as shock, worry, and anxiety as causes of relapse. The largest number of patients suggesting any other cause (such as diet) was four. Wittkower feels that similar events would not have precipitated colitis in other individuals. He states also that many of the patients had had spells of diarrhea when nervous before the onset of illness. Both writers feel that the personality factor is important. Wittkower found that thirty-seven of the patients showed psychological abnormalities which were "well beyond the range of normal". He says that although no uniform personality type could be established, almost all the patients showed character disorders, obvious neuroses, or psychoses. The personality types seemed to fall into three main groups: group I, characterized by over-conscientiousness, over-scrupulousness, orderliness, obstinacy, etc., was made up of obsessional neuroses; group II, characterized by emotional lability, temper tantrums, childishness, self-centerdness, and suggestibility, consisted of hysterias; group III, less well defined than the others, contained some schizothymes and depressions. There was overlapping.

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Wittkower goes on to say: "If we assess the relative significance of emotional and psychological factors in the etiology of ulcerative colitis, very little can be said in favor of a primary bacteriological or dietetic origin". And again, "the psychological background described is not necessarily the important etiological factor in this severe organic disease, but it is certainly an important factor".

Cullinan stresses the importance of treating the personality of the patient,

and says that under Wittkower's psychotherapy, two patients who had had the disease for years practically recovered. He feels that in selected cases this should be attempted.

STATISTICS AND MEDICAL CARE

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Simultaneously with the increased stressing of emotional elements in gastrointestinal disease, we find reference in the literature to a possible increase in psychosomatic illness itself, especially in young people. Halliday (11), Regional Medical Officer, Department of Health, Scotland, found that during the last 10 years there has been an increase in diagnoses known to cover psychosomatic illness and an increased duration of incapacity, both especially affecting the vounger age group. "In 1935, I wrote 'It is interesting to speculate how far the rise in the rate of incapacity among insured persons during the last ten years has been due to an increased prevalence of psychoneurotic disability'. The present paper-an analvsis of morbidity statistics-shows that in the light of modern knowledge the only possible interpretation of the maintenance of the present high sickness rate is an increase in psychoneurotic and psychosomatic illness.... Of 335 unselected patients suffering from psychoneurotic illness (mainly anxiety states), the certificated cause of incapacity in approximately one-half (170) was one or the other of those labels (each of which is already known to cover psychosomatic illness i.e., gastritis, rheumatism, anemia, debility, and heart disease). "The proportion of psychoneurotic illness for each label was as follows:-gastritis 70 per cent, rheumatism 40 per cent, anemia 40 per cent, debility 60 per cent, and heart disease 14 per cent". Of 205 unselected patients with peptic ulcer, in 84 per cent the symptoms of ulcer showed

themselves first at a time of emotional upset in the patient.

Another interesting fact is that Halliday found the psychoneurotic disability highest in the younger age group: 16 to 34 years 33 per cent, 35 to 54 years 42 per cent, 56 to 65 years 14 per cent. Pearson (18) similarly found the following: 0 to 29 years 22 per cent, 30 to 49 years 19 per cent, 50 to 65 years 5.5 per cent. The rate of increase in sickness was most in the younger group, and in these the greater for peptic ulcer and gastritis. Next was nervous debility, then bronchitis, anemia, rheumatism, and heart disease. Kantor (13) calls attention to the fact that excessive laboratory diagnosis may obscure the complete picture and stresses the need for treatment of the whole man in the practice of gastroenterology.

Another point stressed by Pearson (18) is that not only do the functional or nervous patients not benefit from medical treatment without adequate psychiatric treatment, but actually are often made worse by it, or the continued routine mechanistic treatment may fix symptoms for life. The risk is increased if the treatment is very intensive or very impersonal.

At least, the doctor and patient need to keep the open mind stressed by Dunbar (7), Hall (10) and the increasing number of others who say that it is no longer a matter of "either or", but rather a matter of seeing the various factors in clearer perspective. Which are the critical factors in management and which are the critical factors in etiology in these illnesses?

Conclusions

In attempting to evaluate psychiatric factors in illness, the emphasis should be on the personality of the individual, and his methods of adaptation to the environmental situation,

rather than on the environment itself.

The early diagnosis and correct treatment of functional disorders of the gastrointestinal tract is especially important since there is probably no other set of organs where there is a greater percentage of illness that begins on "a functional basis". It is probably equally true that there is no other set of organs where malfunctioning more readily results in structural pathology and the development of chronic disorders.

Recent statistical studies here and abroad indicate an increase in psychosomatic illness, especially gastrointestinal disorders. Recent surveys would suggest that the hospital and community, as well as the patient, are saved time and money by the early, adequate treatment of the emotional difficulty which is at the basis, or is a contributing factor to the illness.

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REVIEWS, ABSTRACTS AND CORRESPONDENCE

LASSWELL, HAROLD: Verbal References and Physiological Changes During the Psychoanalytic Interview: A Preliminary Communication. *The Psychoanalytic Re*view, January, 1935, vol. 22, no. 1, pp. 10-24.

The author developed a technique by means of which changes in the emotional tension could be observed on the basis of the correlation between certain factors of the patient's verbal production and certain physiological variations. It was found that changes in conscious affect are associated with pulse rate and changes in unconscious tensions are associated with electrical skin conductivity.

M. G.

SAUL, LEON J.: A Note on the Psychogenesis of Organic Symptoms. *Psychoanalytic Quarterly*, 1935, vol. 4, no. 3, p. 476.

Psychogenic organic symptoms may be the symbolizations of emotional conflicts but they also may be incidental results of appropriate and readily comprehensible emotional expressions. An example is given of a case in which a sore throat occurred during sleep when the patient was breathing through his mouth while he was dreaming of being fed. The oral breathing is a symbolization, the sore throat is only incidental.

M. G.

The Influence of Psychologic Factors upon Gastro-Intestinal Disturbances: A Symposium: A Report upon Research Carried on at the Chicago Institute for Psychoanalysis. The Psychoanalytic Quarterly, 1934, vol. 3, pp. 501-588.

1. Franz Alexander: General Principles, Objectives and Preliminary Results. 2. Catherine Bacon: Typical personality Trends and Conflicts in Cases of Gastric Disturbances. 3. George W. Wilson: Typical Personality Trends and Conflicts in cases of Spastic Colitis. 4.

HARRY B. LEVEY: Oral Trends and Oral Conflicts in a Case of Duodenal Ulcer.
5. MAURICE LEVINE: Pregenital Trends in a Case of Chronic Diarrhoea and Vomiting.

In this symposium, Franz Alexander starts to report about the research upon the Influence of Psychological Factors upon Gastro-Intestinal Disturbances, in which the Chicago Psychoanalytic Institute is engaged as a part of a more comprehensive study, namely the systematic investigation of the influence of psychic factors upon the different vegetative systems—the circulatory, respiratory and endocrine.

The most conspicuous feature in the psychoanalysis of the gastric cases (three gastric neuroses and nine duodenal ulcers) is intense receptive and acquisitive wishes against which the patient fights because they are connected with extreme conflict in the form of inferiority feelings. The psychoanalytic investigation of these gastric cases may be summarized with the slogan "I do not want to take or to receive; I am active and efficient and have no such wishes". In some of the cases the receptive wishes are not internally inhibited but externally by circumstances.

The psychoanalytic formula of the five studied colitis cases is "I have the right to take and demand for I always give sufficiently. I do not need to feel inferior or guilty for my desires to take because I am giving something in exchange for it". The diarrhoea serves as a substitute for the giving of real values.

In the five analyzed constipation cases the dynamic background of the symptom may be verbalized as follows: "I do not take or receive and therefore I do not need to give". The constipation is a reaction against the obligation to give, and is linked with the fear of castration.

The gastro-intestinal tract according to its three major functions of in-taking, retaining and eliminating is very suitable for the expression of these three elemen-

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rson-3. tary tendencies if their normal expression through the voluntary motor system or the sex apparatus is inhibited through inner conflicts. The upper end of the tract is well fitted to express the receptive or taking tendencies, whereas the lower end is more suitable for the expression of giving and retentive tendencies. In-taking may be passive receiving, or an aggressive taking and also eliminating may be a giving of positive value or an aggressive attack.

The analysis of the individual's emotional attitude to his environment in the terms of these three major tendencies is expected to prove useful for the understanding of gastro-intestinal disorders and even may have more significance. Physiologically, the process of life can well be described in terms of these three major functions.

Catherine Bacon gives a very clearly written report about the typical personality trends in cases of gastro-intestinal disturbances. George Wilson gives the analytic story of some cases with spastic colitis. Harry B. Levy describes the oral trends and conflicts in cases of duodenal ulcers and Maurice Levine reports about the analysis in a case of chronic diarrhoea and vomiting.

This symposium is a basic stone in the building of modern psychosomatic medicine—a summary of the first practical results—a unique proof of psychoanalytic group work and a master example of the methodological approach of psychoanalysis in the field of psychosomatic medicine. It should be available in book form.

M. G.

Benedek, Therese: Mental Processes in Thyrotoxic States. The Psychoanalytic Quarterly, 1934, vol. 3, p. 171.

The psychoanalytic study of two cases of hyperthyroid psychoses demonstrates that the organically determined anxiety appears in the psyche as symptoms or manifestations involving the destructive instinct. In these cases it is impossible to say whether anxiety or aggression is the primary state; both appear together. An increase in heterosexual libido in both cases bound the aggression and anxiety, so that sexual tendencies appeared as an antag-

onist of the aggression. Concerning the principles involved in hyperthyroid psychoses, it seems to be a new point that the anxiety and aggression produced by a thyrotoxicosis are elaborated by the psychic apparatus to increase the severity of the superego and give rise to a clinical picture of depression.

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Schilder, Paul: Remarks on the Psycho-Physiology of the Skin. *Psychoanalytic Review*, January, 1936, pp. 274-285.

Human beings know very little about the inside of their bodies but they seem to known their surface, their skin and they seem to have a clear perception of it. Children sometimes answer the question "what is under your skin?" with "me", and it looks as if their "real body" would lie under the skin.

The biological history and the life history determines the final shape of the psychosomatic disorder. Psychogenic manifestations and sensations on the skin have always a meaning to the total experience. The organic disease goes from the periphery (the organ) to the center (the personality) of the subject, the psychogenic disease goes from the center to the periphery. Psychogenic skin conditions of various types were observed and are briefly described.

M. G.

RIBBLE, MARGARET: Ego Dangers and Epilepsy. *Psychoanalytic Quarterly*, 1936, vol. 5, pp. 71–86.

Little Fritz was a boy of eleven years of age who was brought by his very neurotic mother to analysis because of petit mal attacks from which he had been suffering for the past six months. The outstanding traumatic experience of his life was the repeated frustration of the nutritional instinct at a very early age when the ego was weakest. During the nursing period he was on the point of starvation and when he was changed to bottle feeding at four months, he refused to accept it as he refused food later on, so that even at eleven years the mother occasionally had to feed him with a spoon. The threat of starvation meant

ig the not only intense pain and tension but also d psva threat of annihilation. He had no means at the of reacting which brought relief and the a thymother was so preoccupied with her own svehie neurosis that she was unable to help him. of the oicture . G.

As a result the boy was compelled to resort to sleep or unconsciousness. It seems that in early infancy the active ego instinct is weak and has to be stimulated by pleasurable experiences in reality while the regressive or death instinct is stronger. This child seems to have been forced to utilize unconsciousness as a protective retreat so that the ego preservative tendencies reabout mained weak.

M. G.

MENNINGER, KARL A.: Purposive accidents as an Expression of Self-Destructive Tendencies. International Journal of Psychoanalysis, 1936, pp. 6-16.

Accurate and definite understanding of purposive accidents may be obtained from psychoanalytically studied cases. From this it is possible to make certain of the existence of the same motives familiar to the psychoanalyst in other forms of selfdestruction, whether extreme (suicidal) or partial (self-motivations, compulsive submission to surgery, etc.). These motives have the elements of aggression, and preoccupation with death as the occasional but exceptional outcome. With this and with some other contributions of the same author as for instance his paper, "Psychoanalytical Studies of the Significance of Self-Mutilations", Psychoanalytic Quarterly, vol. 4, p. 408; his paper "Polysurgery and Poly-surgery Addiction", Psychoanalytic Quarterly, vol. 3, pp. 173-199; or his study, "Psychological Factors in Urological Disease", Psychoanaltyc Quarterly, vol. 5, 1936, pp. 488, as well as his book "Man Against Himself", Karl Menninger made a most important and significant attempt to introduce psychoanalytic thinking into surgery and neighboring fields-contributing in this way to the spread of psychosomatic approach in medicine.

M. G.

Soley, M. H. and Shock, N. W.: The Etiology of Effort Syndrome. American Journal of Medical Sciences, 1938. vol. 196, p. 840.

The Etiology of Effort Syndrome is a very interesting study in the pathologicphysiology (bio-chemistry) of anxiety states characterized by overbreathing (sighing respirations). It is, therefore, a study in pathogenesis rather than etiology.

A careful analysis of the disturbance in acid-base chemistry that occurs during hyperventilation shows that the shift in acid-base equilibrium due to the excessive loss of carbon dioxide from the lungs involves a change in pCO₂ and pH primarily. Inspiration of CO2 will alleviate the symptoms by replacing the CO2 lost by overbreathing and the pCO2 and pH values will return to normal. Breathing a CO² mixture relieves the symptoms of hyperventilation within a few seconds. They emphasize that in sufferers from anxiety states complicated by the hyperventilation syndrome, treatment with sedatives, acidifying drugs and diets is merely a temporary measure to carry patients along comfortably while psychiatric investigation of the anxiety is undertaken. Furthermore, they feel that the general practitioner or internist may be able to treat the patient psychologically although in many cases study by a psychiatrist is required. They call attention to the necessity for discarding the old term effort syndrome and suggest "anxiety state with hyperventilation syndrome".

Comment. Anxiety attacks are still unrecognized as psychological disturbances by the majority of physicians in spite of their accurate description by Freud more than forty years ago. Patients suffering such attacks are still diagnosed heart disease, thyrotoxicosis, neurocirculatory asthenia, "bilious spells", hyper or dysinsulinism, etc. So far as the term neurocirculatory asthenia is concerned—as a synonym for effort syndrome-most patients so diagnosed are neurotics with cardiac symptoms and to call them neurocirculatory asthenia focuses attention on physical disability rather than on the psychological problem which must be investigated if the patient is to be properly managed.

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Bromberg, Walter and Schilder, Paul: The Attitude of Psychoneurotics towards Death. *The Psychoanalytic Re*view, January, 1936, pp. 1-25.

The concept of death in anxiety and hysteria cases is dominated by the idea that death is the separation from a love object. The beloved person is unconsciously an incestuous object. Basically, death may mean reunion with a love object of incestuous character. The anxiety is partially a defense against the incestuous danger partially due to the libidinous conflict. Death fear in children is connected with the fear that violence will be inflicted by a strong force but death is not conceived as a lasting deprivation.

Obsessional death fear is the expression of sado-masochistic attitudes toward the love object. The ideas of one's own death do not come into the foreground as long as the aggressions are directed against external objects.

In depressive cases the idea of eternal destruction is paramount. In schizophrenia the belief in an eternal magic substance can be the expression of an extreme narcissistic gratification. Death is closely connected with the problem of space and the

Deutsch, Felix: Euthanasia: A clinical Study. *Psychoanalytic Quarterly*, 1936, vol. 5, pp. 347-368.

Euthanasia occurs when all aggressive reactions subside, when the fear of death has been dispelled, and when there is no further question of a sense of guilt. Such happiness in dying is possible when the path of regression of the libido to the objects of infantile love can be retrodden without any feeling of guilt. In early childhood such attachment is associated with an intense sense of guilt. It is self-evident that in so profound a regression the pleasurable gratifications will tend to revert to the oral stage. Before freedom from a sense of guilt can be achieved, guilt must be atoned for by the knowledge of imminent death with all its psychical consequences. Guiltfree regression to incestuous objects prior to death is possible only when death is recognized as inevitable and imminent.

M. G.

FREEMAN, BURRILL: Psycho-Social Repression and Social Rationalization. The American Journal of Orthopsychiatry, January, 1939, vol. 9, no. 1.

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This paper is a preliminary attempt to build a bridge between Marxist analysis and psychoanalysis by indicating how the material factors on which Marx laid stress operate on human thought and action through dynamic emotional processes. It is suggested, for instance, that repression operates to conceal the true nature of the productive relationships of society. What Marx calls the "fetichism of commodities", in which commodities are thought of as having a value of their own, apart from the necessary social labor that has gone into them, is called by this author a displacement of affect. Rationalization is said to be responsible for failure to recognize the exploitation of the workers, through a number of psycho-social mechanisms, such as the wage system and the "libidinization" of illusions by freedom of contract.

By a similar use of terminology the author states in Freudian language the social regression accompanying fascism, in which the majority of the working population turn away from self-reliant cooperation with their fellows toward parent surrogates. A number of other Marxist conceptions are similarly translated.

This is an interesting exercise in terminology; it is suggestive that Freudian conceptions can be used to denote social theories already formulated in other words. There is no attempt in this paper either to test the objective reality of the theories themselves or to inquire whether the psychoanalytic approach here applied really explains why people think or act as they do in social relationships.

G. S.

BILLINGS, E. G.: General Hospital; Its Psychiatric Needs and Opportunities It Offers for Psychiatric Teaching, *American Journal of Medical Sciences*, 1937, vol. 194, pp. 234–243.

Because it had been reported that personality disorders made up 35 to 75 per cent of the case load of general practise, Billings in the University of Colorado Medical School, attempted to determine the

frequency with which psychiatric problems occur in the average general hospital and clinic. He studied the clinic for eleven and a half months (1934-35), and the wards for seventeen and a half months (1934-36). They found that 3.83 per cent out of 28 of the ward cases were referred to psychiatry by the medical staff. These did not include minor personality problems. One out of 17 of all cases admitted to the medical clinic (14.6 per cent) were thought to be mainly psychiatric problems. Both of these groups he felt needed treatment by a psychiatrist of considerable experience and training. Further studies of the cases showed that nearly as many more patients had problems which could not be treated by a physician without some medico-psychiatric experi-

ence and training. They also found that a large percentage of chronic shoppers were readmitted to the general hospital. One guesses that many of these had remained sick because their difficulties were of a psychiatric nature which had either not been early recognized by the medical men who had treated them in the past, or even if recognized, they had not been referred for necessary treatment, as is often the case. A very important point has been brought out by these studies, which is that the main age group of these patients is younger than that in psychiatric hospitals; 21 to 30 years, as compared to 31 to 40 years. The younger patients are less rigid, and hence respond more quickly to therapy. The interesting question arises as to how many of these patients if treated during the period of their illness in which they are admitted to general hospitals with minor somatic complaints might be prevented from reaching the mental hospitals. By comparing the general hospital patients in this group to a group of patients in a mental hospital, it was found that the average stay was one month in comparison to two to four months.

A. L. B.

RAYCROFT, J. E.: Mental Hygiene in General Hospital. *Hospitals*, 1937, vol. 11, pp. 40-42.

Raycroft on the basis of a study of the hospital care of the nervous and mental patients in New Jersey states that it is very important that these patients be cared for early and when possible in general hospitals before they are sick enough to need care in a mental hospital. He also brings out a very important aspect, which is that about one fifth of the patients admitted to the general hospital "have problems which are neuropsychiatric, quite apart from what the first diagnosis may reveal of the patients' physical illness and condition." We would like to add to this the fact that these problems may often greatly color the physical symptoms, or in some cases be at the root of them, and that the medical treatment, no matter how skillful it is, will not be sufficient in itself. As Raycroft writes, if improperly treated "these cases may develop all sorts of chronic and stubborn disabilities, and progress to a point where it may be necessary to commit them to a mental hospital. Not only is the patient himself greatly benefited by the early recognition and treatment of these disorders, but the hospital and community are saved a great deal of money, because the time required for early treatment is so much less if the functional element is seen before the patient undergoes elaborate medical treatment or operation, or develops many more nervous symptoms necessitating care in a mental hospital".

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INSULIN SHOCK ON SCHIZOPHRENIC PATIENTS: PSYCHOMETRIC RESULTS AND PROGRESS NOTES (ABSTRACT)

PHILIP WORCHEL, M.A.*

THE EFFECT of certain drugs on behavioral activities has long been a matter of speculation and research. The present abstract summarizes the effects of insulin produced hypoglycemia on the behavior of eighteen patients diagnosed schizophrenia. It is true that for practical purposes the therapeutic aspect of such treatment has been emphasized. It is not contended that the results are due primarily and only to the injection of almost-fatal doses of insulin. In order to make such conclusion one must set up adequate controls and define certain objective behavioral critera for investigation. In the present study, opportunity was taken to investigate related problems such as intellectual impairment, "scatter" on the Stanford-Binet Intelligence Examination, in addition to the effects of insulin. Recourse was had to the findings of other authors in this and related fields for comparative purposes.

For brevity much of the detailed procedure and discussion will be omitted from this abstract, except for mention of the fact that the subjects were all white males who were interviewed and tested with the Stanford-Binet Intelligence Examination prior to the administration of insulin and reinterviewed and retested after the completion of such therapy. When the patient had completed the treatment, the physician-in-charge would give his opinion concerning the improvement of the patient according to the following classification:

* Psychologist, Florida State Hospital, Chatta-hoochee.

 Greatly improved: These are the patients who showed no psychotic residuals and are ordinarily spoken of as having a remission.

 Moderately improved: The patient has some psychotic residuals but was able to make a social recovery.

3) Slightly improved: These were the patients who were somewhat quieter if they had been in an excited state, or more cheerful if they had been in a depressed state. They retained most of their psychotic trends but were able to repress them somewhat. Not expected to make a social recovery, they were furloughed only if the relatives insisted.

4) Unimproved.

Progress notes were kept on the patient either through correspondence with the guardian of the patient, if the patient was furloughed home, or by the attending physician if the patient remained in the hospital.

Table I summarizes the description of the group of 18 patients. Data concerning the duration of the psychosis were secured from the social case histories.

Table II indicates the psychometric results together with the physician's ratings of improvement.

Table III summarizes the progress notes after the insulin therapy. The double lines separate the four classifications of improvement—greatly, moderately, slightly, and none.

Tentative suggestions made on the basis of the present data were:

 The schizophrenic process does affect certain intellectual functions. SUMMA

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 ${\bf TABLE~I} \\ S_{UMMARY~OF~THE~DESCRIPTION~OF~THE~SCHIZOPHRENIC~PATIENTS~SELECTED~FOR~INSULIN~SHOCK~THERAPY }$

Patient	Age	Education (grade)	Approximate Du- ration of Psy- chosis (years)	Time in Hospital Prior to Insulin (months)	Diagnosis
V.S.	18	12	1	2	paranoid
K.J.	16	7	1	5	hebephrenic
P.D.	26	12	1	ĭ	paranoid
H.J.R.	26	6		3	paranoid
W.K.	28	9	2	1	hebephreni
M.H.	32	7	8	4	paranoid
R.L.	36	12	4	19	catatonic
J.G.	25	12	3	1	catatonic
A.B.	22	12	2	4	paranoid
H.R.	26	9	3	28	paranoid
G.G.	22	12	3	1	hebephreni
R.E.	28	7	3	8	hebephreni
J.M.	32	8	I	5	paranoid
D.O.	21	9	?	5	simple
C.C.	17		1	2	simple
H.H.	28	9 8	2	9	paranoid
J.L.	18	10	?	12	simple
N.W.	23	12	9	39	paranoid

TABLE II

SUMMARY OF THE PSYCHOMETRIC RESULTS AND PRESSEY SCATTER BEFORE AND AFTER INSULIN SHOCK THERAPY ON SCHIZOPHRENIC PATIENTS, AND THE PHYSICIAN'S RATING OF IMPROVEMENT

Patient	Terman Vocab- ulary Age		Stanford-Binet Mental Age		Binet Age Minus Terman Vocabulary Age (months)		Pressey Scatter		Physician's Rating of Improvement
	before	after	before	after	before	after	before	after	
V.S. K.J. P.D. H.J.R. W.K.	15.1 below 8 14.4 14.5 16.0	15.3 12.8 17.4 14.5 16.0	15.5 6.3 8.7 10.1 13.2	16.3 11.1 13.0 10.2 13.2	+4.8 -68.4 -52.8 -33.6	+12.0 -20.4 -52.8 -51.6 -33.6	12 21 34 24 14	11 22 36 24 6	greatly improved greatly improved greatly improved greatly improved greatly improved
M.H. R.L. J.G.	12.4 16.0	12.0 16.8 15.0	10.6	11.1 16.1 13.9	-21.6 -26.4	-10.8 -8.4 -13.2	10 43	10 32 17	moderately improved moderately improved moderately improved
G.G. A.B. H.R. R.E.	14.0 14.8 12.4	14.0 14.9 12.8 11.2	10.8 11.9 9.9	13.8 14.1 9.7 9.5	-38.4 -34.8 -30.0	- 2.4 - 9.6 -37.2 -20.4	34 18 15	33 16 10 14	slightly improved slightly improved slightly improved slightly improved
J.M. D.O. C.C. H.H. J.L. N.W.	14.6 12.4 13.4 10.4 below 8 16.5	14.6 12.4 12.8 10.4 8.0	11.8 9.3 11.8 8.7 6.6 15.1	11.6 9.1 11.1 9.3 7.2	-33.6 -37.2 -19.2 -20.4 -16.8	-36.0 -37.2 -20.4 -13.2 - 9.6	12 19 22 4 16 44	12 14 14 19 6	no improvement no improvement no improvement no improvement no improvement no improvement

2) Using certain criteria we note that our group of patients show more or less deterioration.

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3) Data here presented are not sufficient evidence to conclude whether

the deterioration is organic or psychological in origin.

4) The amount of "scatter" for our group is not significant as compared to normal individuals, and does not

TABLE III
PROGRESS NOTES ON SCHIZOPHRENIC PATIENTS AFTER INSULIN THERAPY

Patient	Insulin Terminated	Progress Notes					
V.S.	4/6/38	Furloughed 4/29/38. Monthly letters from home up to December 1938 indicate that patient is getting along well, is working as a truck driver, and is advancing in his occupation.					
K.J.	12/29/37	Furloughed 1/1/38. All letters from home say that patient is getting along nicely and is attending vocational school.					
P.D.	10/29/37	Furloughed 11/10/37. Typical reports from home:—"Condition is excellent, shown no bad signs of any kind, demeanor and health good if not better than any period in his life".					
H.J.R.	4/15/38	Furloughed 4/30/38. Parents write that patient is in good normal condition and his health is fine.					
W.K.	8/26/38	Furloughed 9/3/38. Reports from parents say that W.K. is trying hard to make necessary readjustments, at time complains of exhaustion and becomes despondent. Physically well, and takes good care of himself.					
M.H.	3/1/38	Furloughed 3/27/38. Letters up to July indicate that patient was apparently get ting along all right, but on July 23, "patient is not getting along well; he brood and worries all the time and shuts himself up in his room when visitors are here" Returned 10/9/38.					
R.L.	2/10/38	Furloughed 2/28/38. Letters up to May say that patient was taking it easy, doing odd jobs, and was getting along well. On May 26, "I regret to advise that RI went all to pieces last evening, and doctors could not quiet him or get him to sleep". Returned to hospital on 6/8/38.					
J.G.	7/25/38	Furloughed 9/1/38. Letter in November from wife says that patient shows continued improvement and is getting along nicely.					
A.B.	4/8/38	Furloughed 6/7/38. Letters from home in July and August state that patient wa about the same as he was when he was sent home. On September 11, "son ha not been doing so well in past few weeks and it may be necessary to return him" Returned to hospital on 9/13/38.					
H.R.	6/13/38	Furloughed 8/9/38. Letters from home say that "patient is getting along nicely"					
G.G.	4/23/38	Furloughed 5/26/38. Letters till October indicate that patient was improving som but progress was irregular—"some days fine but other days nervous, dull, poo appetite, and doesn't want to talk to anyone". Suicide:—On October 14 patient "died by his own hand". He had been desponden for some time and parents were going to return patient to hospital.					
R.E.	8/27/38	Unimproved and still in hospital. Evasive and withdrawn.					
J.M.	6/29/38	Unimproved after insulin. Put on metrazol therapy and was improved. Furloughed on 1/7/38. Letter on Dec. 6 says that patient is not doing so well, wor ries, and complains of pains.					
D.O.	3/3/38	Unimproved and still in hospital. Dulled, and active hallucinations and delusions					
C.C.	9/18/37	Furloughed on 12/4/37. Complications developed during insulin therapy and earl discontinued. Returned to hospital on 12/16/37. Furloughed on 3/10/38. Returned to hospital on 5/19/38 with report that patient is "indifferent, dull, an won't mind father".					
н.н.	12/30/37	Furloughed on 1/16/38. All reports indicate that patient is getting along well.					
J.L.	1/6/38	Furloughed on 1/30/38. Letter on 2/21/38, "mental condition worse and resorte to violence". Returned to Hospital on 9/20/38, is quiet, seclusive, and poorly oriented".					
N.W.	1/4/38	Furloughed 1/29/38. Detailed reports from parents say that patient is adjusting fairly well.					

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5) The duration of the psychosis, the diagnosis, and the length of stay in the institution should be considered in selecting cases for insulin shock therapy.

6) The follow-up reports to the present date substantiate the efficacy of the treatment on those patients who were considered greatly improved.

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REVIEWS, ABSTRACTS AND CORRESPONDENCE CLINICAL ABSTRACT

RECORD OF A CLINICO-PSYCHIATRIC CONFERENCE

ILLUSTRATIVE OF AN APPROACH TO PSYCHOSOMATIC STUDY*

EDWARD WEISS and O. Spurgeon English**

DR. WEISS:

THE PATIENT, a single woman of 32, was admitted to the Temple University Hospital, service of Dr. Brown, Sept. 27, 1938. She complained of weakness, nervousness and loss of weight. These symptoms had been present for many years but, for the last year, had been so severe that she had spent most of her time in bed.

The ordinary facts of the medical history follow. She states that she was a healthy child and recalls only measles among the childhood diseases. No other serious illnesses occurred. She began to menstruate at the age of 14 and menses were always too frequent. At about 17 she began to menstruate profusely. At this time she was admitted to another hospital where an abdominal operation was done, a bicornate uterus was found; one of the horns was sutured; and the appendix was removed at the same time. The operation had no effect on the profuse menstruation. Radium was next tried but neither did this effect a cure. Then she began to lose appetite and weight and suffered from tachycardia, palpitation and shortness of breath. Her weight decreased from about 110 to 85 pounds and just before her first admission to this hospital in 1931, at the age of 25, the appetite was completely lost, the patient refusing all forms of food except liquid. There was some nausea but no vomiting. She was severely constipated and used enemas as the only effectual means of controlling it. She remained in the hospital for two months; was considered to have some endocrine dysfunction, and was treated by means of insulin and managed to gain some weight, which, however, soon was lost after she returned home. The profuse menses continued and one year later she was again admitted to the hospital where a hysterectomy was done. The tubes and ovaries were allowed to remain. The patient, however, failed to gain strength and weight and has continued with chronic anorexia ever since—her weight varying between 70 and 90 pounds. During the past year she has become progressively worse, has spent most of her time in bed, and just before this admission to the hospital weighed only 70 pounds.

Family history: The mother died in 1929, when the patient was 23, of cancer of the stomach. She had been sick for 2 years. The father is also dead—the patient thinks that he died also of cancer of the stomach, but is not sure. The mother and father had separated when the patient was 10. The patient is the youngest of a family of seven children. One of her sisters also died of cancer in 1935. All the rest are healthy according to the patient. She makes her home with the oldest sister, another sister and a brother.

* This is a teaching exercise lasting one hour, and in no way pretends to be a complete study of the case. ** [Temple University Medical School—Senior Chass.] from are no and the nothin althousell phair a

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Physical examination shows an emaciated young, white woman, but aside from the severe undernutrition there are no noteworthy physical findings and the routine laboratory studies show nothing abnormal. You will note that although the breasts are small they are well preserved and axillary and pubic hair are present.

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To summarize this problem let us say that the illness revolved around two systems particularly, that is, the question of the profuse menstruation eventuating in the removal of a bicornate uterus and the long history of chronic anorexia with considerable undernutrition. Both go back many years, probably to the age of 17 or 18 if not before, and have resulted in a severe degree of invalidism—that is, an illness necessitating bed care for the past year.

How shall we attempt to work out this problem? When people say they cannot eat one thinks first of the stomach and so here, by means of physical examination, studies of gastric and biliary secretions, and X-ray studies of the gastrointestinal tract, we exclude organic disease not only of the stomach but of the remainder of the gastrointestinal tract and its appendages. Next, of course, we think of the possible systemic diseases that might be responsible but we find no evidence of heart, lung or other system disease, including the neurological system, so let us turn out attention to an etiological approach.

We can discover no evidence of a chronic infection, "focal" or otherwise; the temperature and pulse are normal; the sedimentation rate is within normal limits; we do not know of any metabolic disorder that could be responsible (aside from the one that I shall mention shortly in another connection); nor are we aware of any allergic process that will give this clinical picture. How about the endocrine system? Certainly

this is not myxedema although the basal metabolism is somewhat depressed, minus 14 per cent; nor is there anything to indicate that it is Addison's disease even though the blood pressure is low, but there are certain aspects of this clinical picture that resemble a rare condition that is known as Simmonds' disease or pituitary cachexia. The latter, however, presents a profound picture of emaciation with loss of hair from the genital and axillary regions, and wasting of breasts and genitalia, finally resulting in coma and death in a much shorter period than the duration of this illness. This clinical picture might be stated to be a kind of mild copy or imitation of true Simmond's disease but by no means as profound. Therefore, by means of the bare facts of medical history, physical examination and laboratory studies, we are unable to say what is responsible for this illness. Let us see what a study of the life situation will show.

DR. ENGLISH:

From the psychiatric standpoint we need to know not only from what diseases a patient is suffering but also how the patient is behaving. The taking of food is surely a piece of behavior, as well as a biological necessity, and, as a piece of behavior, it may serve to express something in addition to its normal function of nourishment.

Most of you are familiar with the eating behavior of children, where refusal to eat very openly conveys reaction to disappointment, stubbornness, refusal to compensate, unwillingness to participate in the environmental routine, or lastly, a desire to return to an earlier form of feeding or type of food taken.

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In studying this patient we cannot reconstruct everything which took place in early childhood. Much is not remembered, and time permits distortion to creep into what has been remembered. So often in adult patients we must pay close attention to the current behavior and attitudes, and from these reconstruct what has taken place during emotional growth. We have found this to be a safe procedure because early life behavior patterns tend to repeat themselves with but little distortion.

When we review the life history of our patient we find that she was the youngest of a large family and that she was always what she calls "a picky eater." She was always indulged by her mother and the rest of the family, coaxed to eat more and became the center of attention in the family group because her appetite was so poor. She states that her home life was pleasant, although she refuses to talk about her father, who separated from the mother when the patient was 10, and, as she grudgingly admits, "drank a great deal but was good to the family". The patient had a common school education and went to work at the age of 18 as a weaver which, she states, was too heavy for her and her mother did not want her to continue, but she managed to stay for two years and then had her first admission to the hospital because of profuse menstruation. Afterwards she got a job as a clerk but, following her mother's death in 1929 when the patient was 23, she had what she called a sort of nervous breakdown-cried a good deal and has not been able to work since. It is interesting that another sister, who is "wonderful to her, just like mother was", took the patient's position in the clerical job and has continued ever since while the patient has remained at home, an invalid, looked after by this oldest, working sister. Another sister, four years older, works in the same place, and a brother, who was a weaver, has been unemployed for the past four or five years. He, also, makes his home with the three sisters. The patient states that she gets anything she wants—"my sisters see to that".

Her illness, therefore, goes back to the mother's death when the patient was 23 years of age. At this age we expect normal, well-adjusted people to have a good working ability, a certain recreation program, and to be at least thinking of home formation and community responsibility, if not actually engaged in either of these latter activities.

As we study this patient's behavior for the past eight years, we see practically nothing of this more mature attitude toward life. She has done no work at all, she has shown no interest in the opposite sex, home formation or children, and she has had no recreational program. In fact, she becomes very emotionally distressed when she is questioned about her attitude toward the opposite sex or recreation, and states that she does not feel they are important in any way and certainly have nothing to do with her illness. In spite of the fact that her endeavor in these fields has been so limited the patient tries to give the impression, and actually seems to believe, that she has been, as she describes it, "a very active person". When questioned specifically about the activities she has to admit she has never had a date, never danced, never played cards, and that she has never actually participated in any outdoor sport. She maintains that she has many friends, but these friends are those in the neighborhood who come to bring her sympathy and occasional gifts. From these gifts of money, she, in turn, gives part to those she considers less fortunate than herself. This leads her to say that she "is always helping people". She likes to talk of helping people and to listen to her one

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The patient is emotionally a very sensitive person. If questioned about the opposite sex she pouts and turns her back upon the examiner. She is unable to think very coherently and is even unwilling to take the responsibility of remembering certain facts out of her past life. One gains the impression that she knows the answer but she says, "I can't remember exactly, you had better ask my sister". She finds it difficult to adapt to life in the ward and is eager to return home to her own family. Her eagerness to do this seems to disregard her expressed desire to get well, to eat better, to gain weight and to be able to do things. As a result of insulin therapy she has gained several pounds in weight, but seems to disregard this fact and wants to hurry home almost as if she wished to lose the added weight and resume her former life of invalidism. During the past year the patient has spent most of her time in bed. She is fed, and otherwise taken care of by her sisters, like a child of one year, including the regular giving of enemas. Obviously, life at this level is what she wants, but she cannot admit it; in fact, she must try very hard to deny it. Her denial takes the form of a refusal to discuss why she is not participating in life as a very active individual. This strong, unconscious urge to be dependent, accompanied by a strong conscious need to deny this dependency, has been shown by Franz Alexander and other workers to be a prominent psychological pattern in certain cases of gastric dysfunction. In marked contrast to this pattern we see some people who have no conflict whatever over living at the expense of their family or of triends for an indefinite period. They have an excellent appetite and no conflict whatever over being dependent upon others; in fact, seem to expect it and say they consider anyone unreasonable who tries to change this state of affairs.

Some of the things we have said about this patient and her desire to return home, to be taken care of by her family, might indicate that this is the cause of her illness. It is by no means as simple as that. While it is true that her symptoms permit her to live in this pleasant, dependent state, she does not consciously seek it and what she obtains in this way is referred to as secondary rather than primary gain. In fact, it is this very denial of her dependency which accounts in no small measure for her inability to eat. It is as if she would say, "I am not dependent. I will not show my dependence by eating yet doing nothing like an infant. I do not give, therefore, I do not deserve to receive". In a more general way, the patient, by being unable to eat is refusing to participate even in this simple piece of life activity.

As we reach the question of treatment we must consider that we are dealing with a person who is emotionally quite ill. She has a very severe neurosis of the conversion hysterical type, but in some ways her regression almost approaches psychosis. Treatment, if it can be carried out at all, would need to be of an intensive psychological nature. Not only would the patient need to be treated psychologically but the members of the family would need also to be instructed in the meaning of her illness and their cooperation enlisted. When this patient is deriving so much satisfaction from being taken care of, the "do for others" attitude which she has is no doubt also present in a similar degree in her sisters and is finding an outlet in the care of this girl. This brings a mutual kind of satisfaction, both to the invalid and the family, and such a pattern of behavior would need to be exposed to the consciousness of everyone and gradually broken up.

Prognosis in this case is not very favorable but we never know how much can be accomplished until the meaning of such an illness as this is made clear to the patient, explained to her family, and an honest attempt made to regain health. While the patient has not as yet shown herself responsive to education, she might become so if the family could take the initiative and make her feel they wanted her to grow to be an emotionally stronger person.

DR. WEISS:

The first thing that is obvious to us is that without this story of the life situation of this patient we could not possibly understand her illness. In other words, we have approached the problem from a psychosomatic standpoint and are at last in the possession of the correct diagnosis which is anorexia nervosa, or what might be called a metabolic disorder of psychological origin.

In 1874, Sir William Gull observed a disorder of young persons with symptoms which were the same as those that are now included under the heading Simmonds' disease—emaciation, scaphoid abdomen, amenorrhea and the appearance of age. He noted the slow pulse and sub-normal temperature, the equivalent of the depressed basal metabolism, so frequently mentioned in these case reports. He made shrewd observations as to psychic behavior of his patients. In particular, he noticed their sense of well-being and their excessive activity in spite of extreme emaciation. He pointed out that this degree of activity would be impossible if the inanition were due to constitutional disease. After discussing hysteria, he chose the term, anorexia nervosa, as a name for the disease. He pointed out that all of the symptoms could be explained on the basis of the undernutrition which in turn was due to a "morbid mental state". This was at a time when the function of the pituitary gland was unknown. It is remarkable that in spite of this clear description, so much confusion still exists in regard to this disorder. At about this period of medical history and even earlier, many morbid states, which were recognized as of psychological origin, succumbed to the structural orientation of the new cellular pathology and, therefore, were considered of physical origin. Moreover, the recent impetus in endocrinology was a further reason for considering this disorder of pituitary origin. Simmonds in 1914 described the destruction of the anterior lobe of the pituitary gland which he observed at autopsy in certain cases, and reconstructed from the history the clinical picture of the disease that now bears his name. While the clinical picture of anorexia nervosa may reproduce all the symptoms of true Simmonds' disease the changes usually are not nearly so marked as we see in the true pituitary cachexia and even autopsy observations prove that the pituitary is structurally intact. From a psychological standpoint it has been said "that just as these patients are physically starved so are they emotionally starved". I would like to put that the other way around, because we must be very careful in the consideration of psychosomatic disorders not to put the cart before the horse. In other words, this condition differs from true pituitary disease because it is the psychological conflict which brings about the loss of appetite and undernutrition and, very likely, this in turn affects the pituitary function which is

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STU Tain closely tied up with the cessation of menstruation and lowered basal metabolism. It seems likely that this is a true interference with the function of the anterior pituitary, but you see that the latter occurs as a result and not as a cause of the disorder. Evidence for this functional depression is that, when the patients improve as a result of psychological or other management, their menses begin again and even pregnancies occur.

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To summarize it can be stated that we have negative evidence from a physical standpoint, and positive evidence from a psychological standpoint to say that we are dealing with anorexia nervosa.

That brings up the question of treatment as mentioned by Dr. English. By means of insulin this patient has managed to put on about 10 pounds since her hospital admission but I am sure that you will agree that it will not take long for her to lose this weight once she has gone home. In other words, it is really only a temporary expedient and unless we can understand her motives and behavior and re-educate her and her family along the lines that Dr. English has indicated, we are really not getting at this problem fundamentally.

STUDENT:

The reference that you gave contained some cases that seemed to yield

to treatment along more superficial lines than you have indicated in this particular case.

DR. WEISS:

In a less severe form, this is a common problem and the majority of cases will yield to a much more superficial psychotherapy than would have to be employed in this patient. In other words, we are dealing here with a very severe form of anorexia nervosa, a deepseated, neurotic disorder with the possibility that the patient may actually become psychotic.

STUDENT:

Is there a possibility that the menorrhagia was also psychogenic?

DR. ENGLISH:

It is true that psychological factors may influence menstruation. Whether such was the case here we cannot be sure. As yet no great amount of study has been made in this important field of psychosomatic relationships, but such a symptom would need just as careful study from a psychological standpoint as from the hormonal side of the problem.

COWDRY, E. V., editor: Problems of Ageing: Biological and Medical Aspects. Baltimore, Williams & Wilkins Company, 1939, xxx, 758 pp. 121 text figures.

Without some consideration, it might seem difficult to believe that twenty-five distinguished authors could be found who would deal with a problem such as senescense each from a different point of view. The volume under review is a compilation by 24 authors in 25 chapters (the late Wingate Todd covered two subjects: Ch. 4 "Ageing of Vertebrates" and Ch. 11 on "Skeleton, Locomotor System and Teeth"). In addition there is an introduction by John Dewey and a foreword by Lawrence K. Frank of the Josiah Macy, Jr. Foundation which aided the publication. Granted that one could find some twenty-five authors who could deal competently with as many approaches to a large subject, it would seem incredible that such an "omnium gatherum" should have any unity or coherence. But American biologists have come in the past to respect the extraordinary skill of E. V. Cowdry in conceiving and editing books such as this, and in handling such a Valhalla of temperament as one associates with the names of: Edgar Allen, Lewellys Barker, Walter B. Cannon, A. J. Carlson, A. E. Cohn, Macdonald Critchley, William Crocker, John Dewey, Louis I. Dublin, E. T. Engle, Jonas Friedenwald, S. R. Guild, G. V. Hamilton, L. O. Howard, A. C. Ivy, H. S. Jennings, E. D. Krumbhaar, C. M. McCay, William MacNider, Walter Miles, Jean Oliver, Wingate Todd, Fred Weidman and Clark Wissler (Karl Landsteiner appears on the title, but he seems not to have contributed to the volume). The well coordinated result of this distinguished mixture is quite surprising. If one were locked for a single night in a room with these twentyfive authors, one wonders what would happen to them or to the individual incarcerated with them. Would his hair 'grow white in a single night'? Probably not, nor would

theirs. On the whole, I think one might emerge rejuvenated—even if unslept. Think of A. J. Carlson and Macdonald Critchley, Walter Cannon and Lewellys Barker, of John Dewey and the fine spirit of Wingate Todd! No; conversation would not be dull, and the last thing one would think of would be senescence.

So, in bringing this book together, the editor must frequently have cracked his whip, but gently enough so that one can still be as fascinated by the subject as by the vivid personality of each of the various authors which exudes from every page. Who but Jennings could possibly write about the ageing protozoa? There are many who might have written about signs of senescence in the female reproductive tract (as well as in that of the male), but none could have been more happily chosen for these topics than Edgar Allen and Earl Engle. Macdonald Critchley writes in a most distinguished manner upon age and the central nervous system, and Walter Miles deals convincingly with the psychology of senescence. Who but Walter Cannon could write upon age and homeostasis? The editor has taken for himself the difficult theme of age and tissue fluids; MacNider has written a most fascinating and provocative chapter on age and tissue resistance. The book ends with Lewellys Barker's account of ageing from the point of view of the clinician. Each chapter is provided with an admirable bibliography in which the references are, for the most part, uniformly given, and with fewer inaccuracies than is common in this age of bibliographical philistinism. The book is a fitting sequel to Cowdry's earlier volume on arteriosclerosis (1933) which was also supported by the Macy Foundation.

From a typographical standpoint, the book is not wholly successful and the Williams & Wilkins Company have certainly printed more attractive books. It is unnecessarily spun out with too much leading in the main text, too much sinkage at the

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commencement of chapters; with a slightly different format and standard set lines of type the material could easily have been compressed into 600 pages; this would have given a more attractive esthetic result. The subject index is fair, but it contains a number of misprints and errors; the book as a whole is marred by the absence of an author

J. F. F.

PROPST, DUANE W .: The Patient is the Unit of Practice. Springfield, Illinois, Charles C Thomas, December, 1938, 219 pp.

The purpose in writing this book has been to systematize the general principles underlying the practice of medicine and to arrange this information in the form which will be "concise, entertaining and usable" for students. Special emphasis has been placed on "the patient as the unit of practice". To that end the nature of disease, the diagnostic hypothesis and the principles of treatment have been considered from the point of view of the patient as a whole in reaction to his environmental field. Psychoanalysis is utterly unknown to the author (although Freud is mentioned in two little lines). Psychotherapy (summarized p. 207), as the author sees it, should proceed along general lines, correction of physiochemical handicaps to stability, simplification of the patient's life and education of the patient.

M. G.

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